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Occasional Papers on the Kinds of Plants

By L. H. Bailey

6. American Palmettoes

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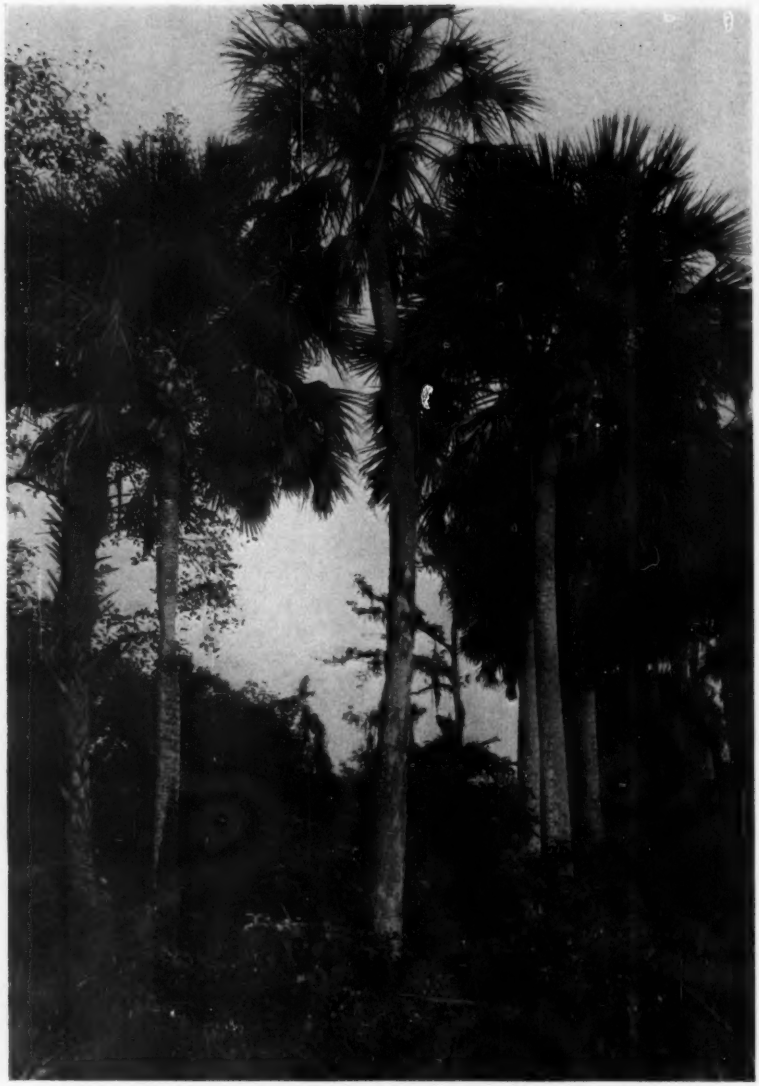

FIG. 145. CABBAGE PALMETTO in the Okeechobee region, southern Florida.—*Sabal Palmetto.*

Gift,
L. H. Bailey
1-9-1935

ARTICLE 6. AMERICAN PALMETTOES

Certain American fan-like palms have long been known as palmettoes, although the name has not belonged exclusively to this occidental group. The word *palmetto* is connected with the Spanish *palmita*, apparently a diminutive of Latin *palma*, although in the early day the "Palmeto Royall" of Barbados was accounted perhaps the tallest organism in nature as we shall learn when, in a subsequent Fascicle, we undertake Roystonea. The name palmetto has been applied to the fan-palm of the Mediterranean country (*Chamærops humilis*) and apparently to other small species. At present, however, its use is so widely and uniformly attached to the American group that other applications may be disregarded.

In botanical nomenclature the palmettoes are Sabals. The word Sabal is of unexplained origin, but is supposed to be a native American vernacular. As a botanical term it starts with Adanson in 1763 in his Familles des Plantes (ii, 495), although its publication cannot be validated from his use of it inasmuch as the account is not full enough for identification, he cites no species nor any literature that describes it. This is in spite of the fact that he left a well prepared attractive specimen at Paris. Adanson's account states only that it is a fan-leaved palm, with many spikes, hermaphrodite flowers bearing a single ovary and three seeds; and an abbreviation indicates that he had seen the plant in Paris (*H.R.P.*: Hortus regius parisiensis) under the name "Palma Caroliniana," and adds "swamp palmeto." If Carolinian, the brief account could apply to any one or all of the three palms known in this day as *Sabal minor*, *Sabal Palmetto*, *Serenoa repens*.

Generic name Sabal is sufficiently validated by Guersent in 1804, when he attributes the name to Adanson and establishes the species *Sabal Adansonii*, with description and figure. His plant, which is the bush or dwarf palmetto of the southern Atlantic and Gulf states, had been well described and figured as early as 1776 by Jacquin as *Corypha minor*, a name that appeared in 1801 as *Sabal minor* by Persoon and which, under rules of nomenclature, must now be adopted. As early as 1768 Philip Miller had discussed vaguely a Jamaican palm designated *Chamærops glabra*, and Sargent about a century and a third later transferred the name as *Sabal glabra;* but there is no plant of this description native in Jamaica and the name should be dropped as a *nomen incertum*. Schultes & Schultes (Syst. Veg. vii, 2, p. 1487) follow Steudel in supposing Miller's plant to be *S. Palmetto*. There is confusion enough in palm nomenclature without attempting to adopt unidentifiable names.

Sabals are citizens of the western hemisphere. About eighty binomials have been applied but many of them are only listed names and without significance in nomenclature. We are able at present to distinguish about a score of species, but the number is undoubtedly considerably greater than this. Palmettoes are troublesome objects to collect for botanical study, under prevailing methods, and the material in herbaria is both scant and of little value in clear identification and diagnosis. Several kinds in cultivation are not yet botanically identified, and certain described horticultural species are not recognized in the wild although undoubtedly still awaiting discovery. The small hard durable seeds would naturally be carried to far places by early voyagers. Under all these conditions, any monograph of Sabal at this epoch is necessarily incomplete.

One previous monograph of Sabal has appeared, that of the late illustrious Odoardo Beccari in Webbia in 1907, in which eighteen species are recognized, five of them being new. Much material has accumulated in the intervening quarter century and various points of nomenclature have been clarified; and we are able now to present good portraits of a number of the species. The present paper aims primarily to distinguish and describe the species collected by the writer over many years in the wild and in cultivation in the United States, Mexico, West Indies, South America, although all the other species are also included, in briefer form, for completeness.

One strong reason for publishing this paper is to present a systematic framework that discloses the weak or missing parts in the hope that they may be the more speedily supplied, as well also as to stimulate the collecting of useful specimens. It would be encouraging if sufficient material and information were to accumulate soon to require a revised and enlarged treatment of the palmettoes.

The Sabals were first known in botanical writings as Chamærops, Corypha, Rhapis, before those generic names were restricted to palms of the eastern hemisphere; and they were not clearly distinguished from the American genera Thrinax and Trithrinax. The genus Sabal has been twice divided. One of the segregations, Serenoa by J. D. Hooker, is universally accepted; the other, Inodes by O. F. Cook, has been less convincing because materials in herbaria have been insufficient to show the characters, and on the other hand the recent accumulation of evidence appears to prove the separation to be untenable. To understand these divisions, as well as the botanical characters to be employed in keys, we must uncover the more evident organography of the group.

Before undertaking the organography the author desires to express gratitude to the Gray Herbarium of Harvard University, the New York Botanical Garden, the United States National Herbarium, for the privilege of examining their collections; to the Missouri Botanical Garden for sight of the type material of *Sabal uresana;* to Brother León of Havana for much

material of the palms of Cuba and to him and others for aid in collecting trips for Sabals and other palms on that island; to H. H. Hume and his associates of the University of Florida, for cooperation over many years; and to John K. Small for his sympathetic assistance on the United States species.

Organography

The Sabals, employing the term broadly, are caulescent palms, although the axis of *S. minor* and a few others is so short or concealed as usually to seem to be wanting, whence the name *Chamærops acaulis* of Michaux.

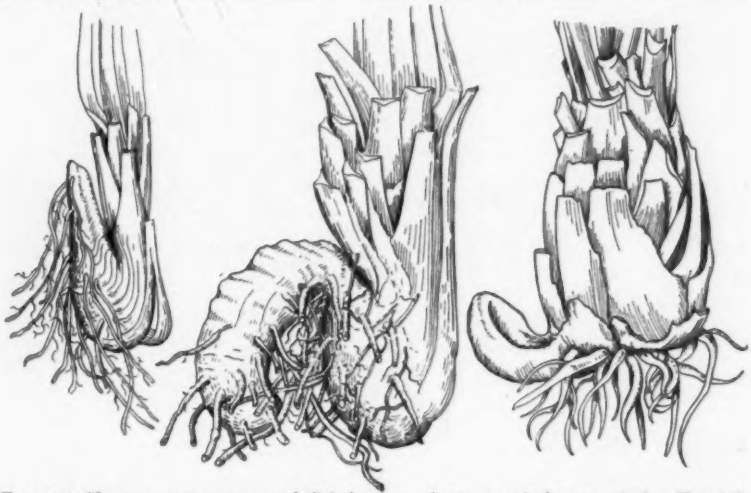

FIG. 146. UNDERGROUND PARTS of *Sabal minor*, about one-sixth natural size. Two left from the wild, first one not yet in bearing age, middle plant fruiting. Right-hand specimen a transplanted nursery subject (Fig. 151) in full bearing age.

Part of the shaft of *S. Deeringiana* is also subterranean. In *Sabal etonia* the stock is wholly subterranean, making odd curves on itself. In Serenoa the part is creeping like a rhizome (Fig. 148) and is often exposed on dunes when the sand is blown away (Fig. 163) and again it rises ten feet or more above the ground; these are ecological manifestations. In most of the species of Sabal the mature trunks are strong and erect, sometimes so thick and straight as to be columnar, frequently attaining more than fifty feet in height. Trunks of the arboreous species are well shown in the photographs in this paper, and special caudices in Figs. 146, 147, 148.

It is probable that the stock of all arboreous palmettoes is horizontal or deflexed following germination and that the prostrate part dies away early in the life of the tree. This behavior is probably a generic character, as indicated by Hooker in Bentham & Hooker, Genera Plantarum, who states that the base of the caudex is oblique and the upper part ascending. The

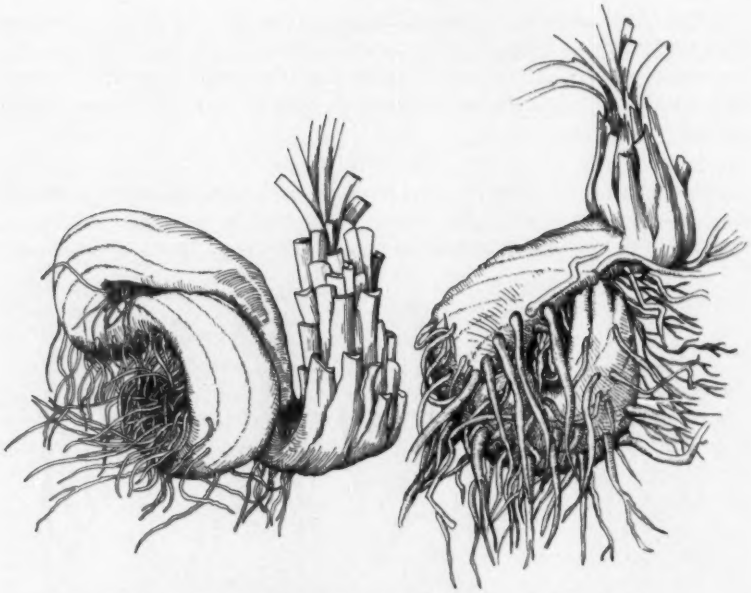

FIG. 147. UNDERGROUND SYSTEM of *Sabal etonia* (× about ⅛).

root-and-trunk system in Sabal is in need of separate morphological study.

The underground behavior in *Sabal Palmetto* (which is well known) is described by the late George V. Nash as follows (Bull. Torr. Bot. Club,

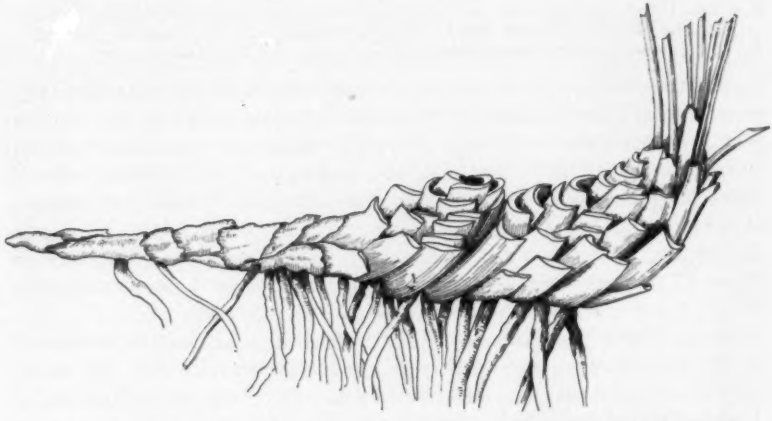

FIG. 148. UNDERGROUND SYSTEM of *Serenoa repens*, in dry sands, southern Florida (×⅛).

xxiii, 99, 1896), after saying that the stock can be found only in very young plants: "It goes directly down, then bends sharply and rises to the surface, continuing in an erect aërial stem which often attains a height of 50-70 feet. In the young plants this downward portion is manifest as an erect spur-like body, appressed to and much smaller than the ascending part of the root-stock, but it soon disappears and in plants but a few feet in height no trace of it can be found. In old individuals, therefore, the subterranean extremity

FIG. 149. THE CRISS-CROSS of cabbage palmetto, petioles cut off.—*Sabal Palmetto.*

of the trunk is knob-like, with hundreds of roots radiating in all directions, making a marked contrast to the elongated and contorted rootstock of *S. Etonia*, bearing roots its entire length."

The rounded lower terminus of the stem or trunk of the cabbage palmetto is also well described by Sargent in Manual of the Trees of North America: "with a short pointed knob-like underground stem surrounded by a dense mass of contorted roots often 4 or 5 feet in diameter and 5 or 6 feet

FIG. 150. COSTAPALMATE LEAF OF young *Sabal Palmetto*, showing the continuing decurved midrib.

deep, from which tough light orange-colored roots often ½ inch in diameter penetrate the soil for a distance of 15 or 20 feet." A correspondent who knows the behavior of Sabals in the nursery states that the underground part of cabbage palmetto is at first not much unlike that of *S. minor:* the growth starts from a given point, extends downward, turns upward and then rises above ground.

Persons interested in germination of palms, and in structure of radices and caudices, may still consult Hugo Mohl in Martius, volume i, of Historia Naturalis Palmarum; and in Arthur Henfrey, Papers. 1849. On stem thickening in palms the consultant may find an interesting discussion by Beccari in Pomona College Journal of Economic Botany, ii, 411 (Dec. 1912).

FIG. 151. BUSH PALMETTO in bloom, *Sabal minor*. Upper left, hastula and base of blade; upper right, full leaf from under side; in both cases the central cleft is shown at A. —A nursery-grown plant.

FIG. 152. BREAKING DOWN OF THE LEAVES of *Sabal Deeringiana*, like partially closed umbrellas. Lake Pontchartrain.

In the various arboreous species the petiole-base widens with the expansion, finally splits, resulting in an interesting criss-cross or chevaux-de-frise appearance on large trunks (Fig. 149). This process is illustrated in the account of *Sabal Palmetto* on page 307. At length the leaves die, the petiole breaks midway, the blade falls, and in most cases the basal part finally loses its hold and the trunk becomes bare. The rapidity and extent of the defoliation appears to depend at least mostly on exposure and rapidity of enlargement of the trunk. In a clump of boles of similar age one often notices different stages of denudation, as in Fig. 145.

How far one can employ investiture or clothing of the trunk in distinguishing the kinds of Sabal is still perhaps subject for investigation, but present indications are to the effect that it is a feature of individual trees rather than of species. Trunk covering is often mentioned in descriptions of palmettoes, yet the author has not been able to discover it as a discriminative character in the observation of various determined species under many conditions and in different ages and therefore has not employed it in diagnoses in the present paper.

Three leaf forms are in the Sabal group,—(1) the few species in which the midrib is very short or even wanting or at least does not extend more

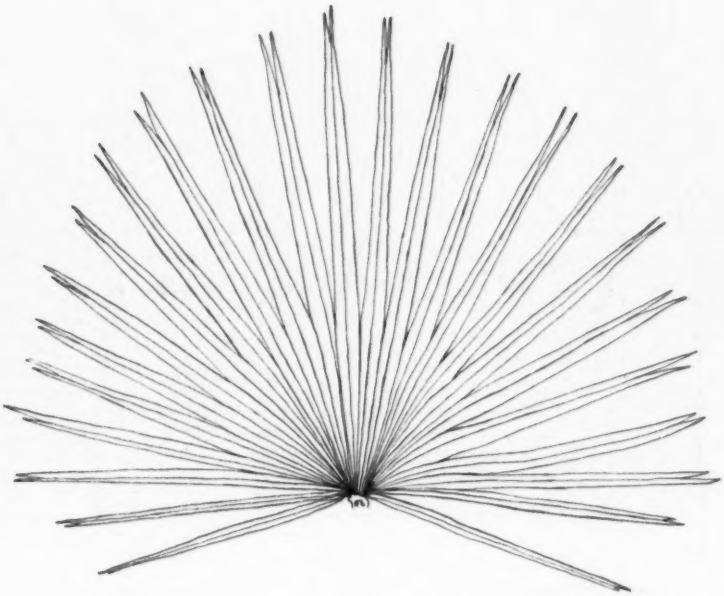

FIG. 153. LEAF OF SAW PALMETTO, *Serenoa repens* (× about 1/7).

than a few inches into the blade, and (2) the mostly arboreous species in which the costa or midrib extends lengthwise the blade somewhat like a rachis and produces a leaf with a peculiar characteristic downward curve as shown in Fig. 150. The former group includes the type of the genus Sabal (Fig. 151); the latter was separated by O. F. Cook in 1901 as a generic entity, Inodes. John K. Small in his Manual of the Southeastern Flora, 1933, treats the two as a single genus and makes subgeneric groups to account for the differences, the Minores and the Palmettones.

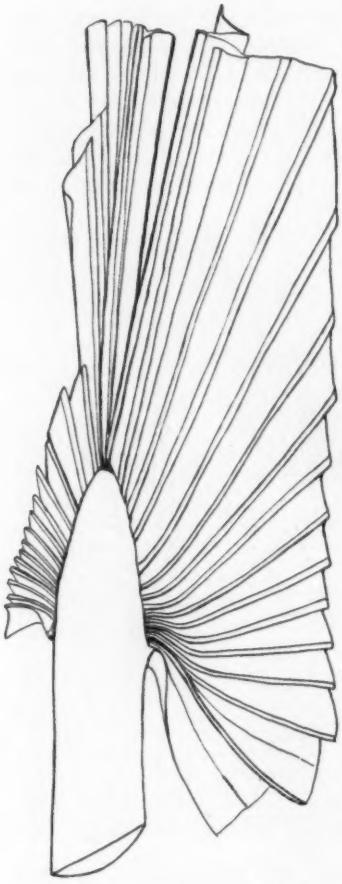

FIG. 154. HASTULA of *Sabal Deeringiana*. Split in blade is shown just right of center (×½).

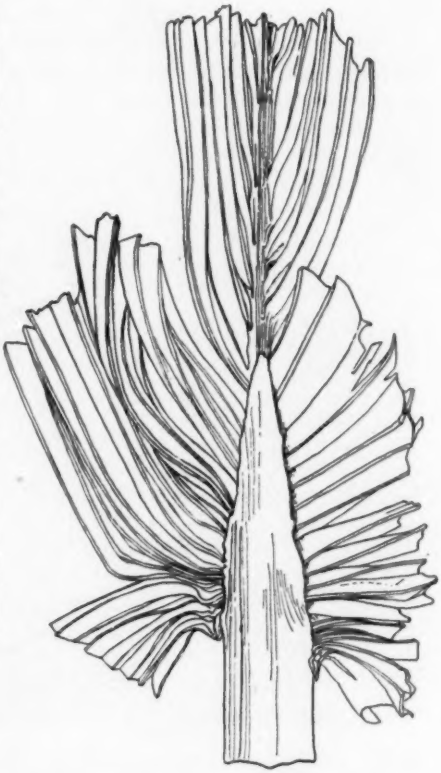

FIG. 155. HASTULA of *Sabal Palmetto*, showing continuing costa (×½).

The two leaf forms in Sabal are of sufficient difference to designate sections or subgenera. Leaves of Sabal proper are essentially palmate, the petiole nearly or quite terminating at the short mostly blunt hastula (ligule) and the segments more or less distinctly radiating therefrom. Ordinarily the blade subsequently cleaves lengthwise or splits about the middle so that it is in two parts or divisions; one of the halves may break down at its base and hang prone from the erect or strongly ascending petiole; sometimes both halves break over, as seen by the photograph of *Sabal Deeringiana* in Fig. 152. Usually a weak or rudimentary rib extends a few inches beyond the hastula but it is not sufficient to give strength to the blade and to prevent it from breaking down; segments do not originate along its sides.

This leaf form does not prevail in the Inodes kind of Sabals, although there are again two classes of leaves in that group. The leaf structure in *Sabal Palmetto* and most others of the arboreous species appears to be unknown elsewhere in palms. The blades are neither pinnate nor palmate or, rather, are *costapalmate*, being a combination of the two contrasting types. The hastula is much elongated and pointed. The costa or rib is a strong backbone, giving structural character and strength to the blade, and along it the lateral segments arise. The singular twist-like decurve in the leaves of these palms (Fig. 150) is usually apparent in good photographs of the trees.

Third leaf form (3) is in the monotypic genus Serenoa, in which the blade is truly fan-like, with segments arising from its base (Fig. 153). The hastula shows on both surfaces. The petiole bears sharp hard teeth on the two margins (Fig. 165) whereas it is smooth or unarmed in Sabal. This genus is dedicated to Sereno Watson, 1826-1892, long connected with the Gray Herbarium at Harvard University.

The hastula has characteristic form in these three leaf types: short and rounded or only briefly elongated in true Sabal as represented in *S. minor* (Figs. 151 and 166); somewhat lengthened but still essentially obtuse as in *S. Deeringiana* (Fig. 154); much elongated and attenuate in Inodes (Fig. 155); much reduced in Serenoa. In most of the species a single long filament or thread (Fig. 157) arises in some of the sinuses.

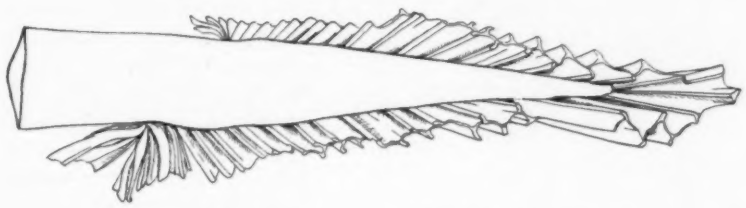

FIG. 156. ELONGATED HASTULA of *Sabal jamaicensis* (× ½).

FIG. 157. FILAMENT or thread in cleft of palmetto leaf segment, about nat. size; often in lower sinuses.

In all palmate or flabellate palm leaves one needs to take note, in diagnosis, of the relative dimension of the undivided part or *palman*, corresponding to the palm of the hand in distinction from the fingers or segments.

Inflorescence or spadix in the Sabal group consists of a long axis, with side-clusters arising from its sheaths or spathelets (Fig. 158). On the ultimate thin short branchlets or *rachillæ* the flowers are borne. The inflorescence is commonly at least as long as the leaves, or becoming so in fruit. In Sabal proper the inflorescence is erect and overtops the foliage although perhaps eventually overarching or outwardly curving. In the Inodes group the inflorescences are essentially horizontal or even drooping, more or less hidden or included in the heavy foliage although the tips may project; side-clusters are often very long and compound, mostly comprising diffuse systems in the larger arboreous species. In Serenoa the flower system is shorter, often several lateral branches emerging from a sheath (main peduncle not exserted), and all the branches are pubescent whereas they are glabrous or only glabrescent in the other genus. These flower-bearing features are explained in the pictures (Figs. 158, 165, 169).

Flowers (as in Fig. 159 and others) are numerous and small, usually 4 or 5 mm. long, stramineous or white, sessile or essentially so although a short pedicel may be apparent in fruit, hermaphrodite, trimerous; calyx short-tubular with three small lobes; corolla exceeding the calyx, of three petals more or less connate at base and lightly imbricate in the bud; stamens six in two series of three; carpels three, conjoined, usually only one maturing, united in a single three-grooved style with capitate stigma, stylar attachment to ovary basal. In Serenoa the three carpels are more or less free at base although tightly placed together and united in a single style, the stylar attachment terminal.

Fruit in both Sabal and Serenoa (Fig. 160) is a small drupe-like body nearly filled by a single seed, infrequently twin or triple by the development of more than one carpel. In Sabal the fruit is variously globose, with mesocarp that in some species is thick and spongy but mostly thin and soon drying over the seed as a membrane, the persistent indurated style persisting as a projecting pedicel-like attachment at the base (Figs. 172a, 179B); seed brown, depressed-globose, very hard, with homogeneous flinty albumen, horizontal or somewhat oblique straight embryo pointing to a circular mostly somewhat sunken inconspicuous lateral micropyle, raphe usually evident on the sunken base. In Serenoa the fruit is usually elongated,

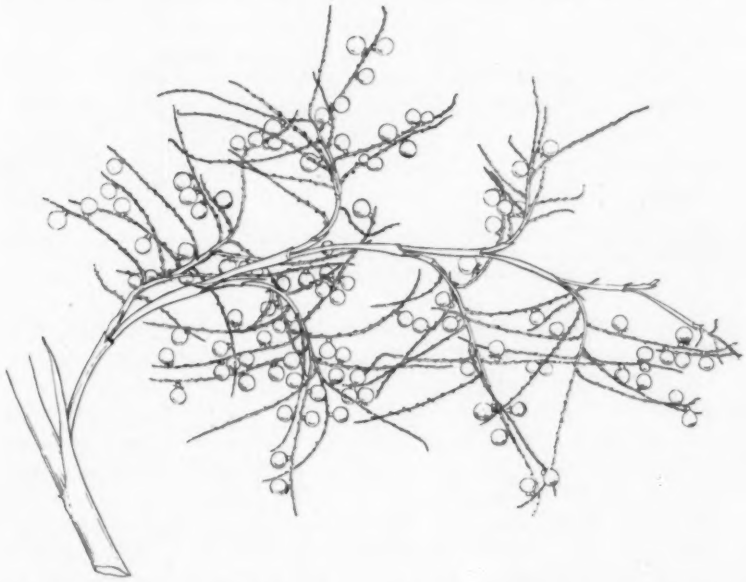

FIG. 158. SIDE-CLUSTER in the inflorescence of *Sabal Palmetto*, now in young fruit (×⅓).

FIG. 159. DETAILS OF FLOWERS of *Sabal minor* left and of *S. etonia* right, with detached pistil, stamen and petal. (Flowers × approx. 3, and separates ×5).

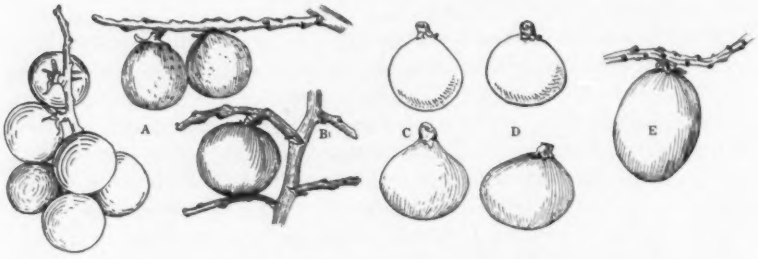

FIG. 160. FRUITS OF SEVERAL TYPES of palmetto, approximately natural size. A, cluster at left and two fruits above of *Sabal minor;* B, single fruit in place of *S. Palmetto;* C, two fruits (above and beneath) of *S. causiarum;* D, *S. jamaicensis;* E, *Serenoa repens.*

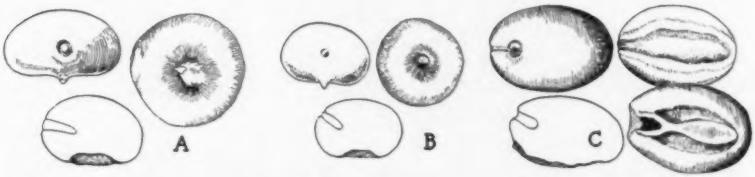

FIG. 161. SEEDS OF THREE TYPES of palmetto, approximately 1½-2 natural size, showing in each case a micropyle view at left, basal view, section with position of embryo. A, *Sabal minor;* B, *Sabal Palmetto;* C, *Serenoa repens.*

closely sessile, with spongy and succulent mesocarp; seed elongated, with micropyle near one end on the back and a lengthwise raphe, embryo oblique.

The pictures sufficiently exhibit the floral structure for diagnostic purposes. All the illustrations of flowers are drawn directly from blossoms in full fresh anthesis preserved in natural condition in liquid just as taken from the plant. The same flower may look very different when pressed and dried on an herbarium specimen.

The photographs (half-tones) in this paper were taken by the author with the exception of Fig. 149, which is supplied by Professor Harold Mowry of the University of Florida and Fig. 185 by Robert Runyon of Brownsville, Texas.

The question of generic segregation

When this study of Sabal was undertaken the writer was sympathetic to the generic segregation of Inodes. In fact, the first draft of the paper proceeded on that basis and the exploratory key assumed three genera, Sabal, Inodes, Serenoa. As the work progressed through the months, however, it was found that the separation is untenable, at least in the present state of knowledge of the palmettoes.

Founding of the genus Inodes was based on *Sabal causiarum* in a striking study of Puerto Rican palms by O. F. Cook published in 1901 in Bulletin of the Torrey Botanical Club (xxviii, 529). "The most conspicuous difference between Inodes and Sabal," he writes, "is, of course, the fact that the former procudes an upright trunk while the latter has only what might be called an underground rootstock. . . . A much more important difference is to be found in the leaves which in Inodes have secured strength by the development of a midrib, a tendency early abandoned by Sabal in which the midrib is rudimentary and the middle of the leaf is the weakest part. The leaves of Sabal are adapted for standing erect and avoid resistence to the wind by being split down the middle. The leaves of Inodes which are held horizontal from an erect axis have attained the unique adaptation of a decurved midrib which braces the sloping sides of the leaf and effectively prevents the breaking above the ligule. . . . Further differential characters might be enumerated, such as the short ligule and the flat petiole of Sabal. The inflorescence and seeds also afford differences, but these points are unnecessary for diagnosis, and their proper expression will require careful comparative study of the species of both genera."

Further statement was made by Cook in 1913 (Circular no. 113, Bureau of Plant Industry, 11, note): "The genus Inodes differs from Sabal in the formation of a thick, upright trunk by secondary thickening of the fibrovascular system below the terminal bud. As a consequence of this habit of growth the leaf bases are split down the middle, as in the Washingtonia palms, but not in Sabal, Erythea, or Brahea. Another difference is that leaves of Sabal are few in number and deeply divided in the middle, because of the slight development of the midrib. The strongly specialized recurved midrib is a peculiarity of the genus Inodes."

It is to be observed that the genus Inodes was proposed before *Sabal Deeringiana* was rediscovered, which, although evidently a true Sabal in its leaves, develops a trunk to eight feet high and in such cases has divided petiole-bases, a somewhat developed costa, and is otherwise quite intermediate between Sabal and Inodes. Neither were the detailed leaf forms of *Sabal mauritiæformis* and *S. Yapa* then available for comparative study, the latter not then recognized as a species and the former brought into the discussion only in a general way; in these trees the blade character of Inodes

is obscured. Moreover, flowers, fruits and seeds of Sabal and Inodes are singularly similar, such differences as exist being specific rather than generic.

Genus Inodes was not accepted by Beccari in his monograph in 1907. Urban recognized it in the text of his Flora Portoricensis in 1903 but reduced it to Sabal in the Addenda. Britton and Wilson do not adopt it in their Botany of Porto Rico, 1923.

The name Inodes is the Greek adjective meaning *fibrous*, applied in allusion to the fibers in the leaves, that supply the raw material employed in the making of hats, mats and baskets in tropical regions.

Herbarium material and the outstanding features in the palmettoes

Before proceeding to the phytographic part of this monograph something should be said about the way in which the palmettoes can be studied.

First consideration is to know the plants in the field. They can never be understood by herbarium material alone, however complete it may be. On the other hand, correct diagnosis and adequate record require ample herbarium specimens.

Aside from size, the aspect of the top or head of the arboreous palmettoes should quickly receive attention. The head may be compact, due to short petioles, or loose and open so that one readily looks through it; the foliage may have a hard rigid look due not only to stiffness but to the direction of terminal segments, or a flexible appearance resulting from many long hanging narrow segments as in *Sabal Palmetto;* relative abundance (or absence) of filaments between the segments should be observed. Length of flowering or fruiting clusters in reference to leaves should be noted. Photographs of the plant are invaluable in diagnosis: compare the heads in Figs. 145, 173, 176, 177, 180, 187.

Flowers in full anthesis (not merely flower-buds), and particularly the ripe fruits and seeds, should be available.

The large fan-palms are likely to fidget the herbarium collector, yet they are not difficult if one knows what parts to take and has the courage to handle big stiff heavy material. Suggestions on the making of palm specimens are printed in Fascicle I of this volume of Gentes Herbarum (March 1933), and it is therefore not necessary to repeat much detail here. If one wants a piece of leaf for a souvenir, it does not matter how much or little is taken; but it is futile to try to understand palmettoes by random fragments.

At least one full side of the leaf should be taken with the entire petiole and the hastula. In the writer's practice the petiole is cut in lengths not exceeding 16 inches and the pieces are kept in boxes that file regularly in

the herbarium case. The half of the leaf is cut into such pieces or parts as can be folded to customary herbarium size and as can be fitted together again on occasion to reconstruct the blade; these specimens are regularly prepared under heavy pressure; they are not mounted in the regular way but are placed in folders (Fig. 16, Fasc. I); if they have not been dried too rapidly the specimens many be unfolded many times without breakage. In the palmettoes it is important to take both the lateral and the central parts of the leaf because the segments are likely to differ markedly from the two areas, so much so that specific characters have been drawn on them; two species of relatively recent date differ, amongst other things, as to whether the segments are elongated caudate-acuminate or merely pointed, yet the two forms may occur on the same leaf (note Fig. 162).

The entire flower-cluster or fruit-cluster is captured and cut into lengths for herbarium boxes. Side-clusters in flower may be pressed and regularly mounted. It is always well to have mature fruits from the identical tree from which flowers are taken.

Phytography of the Palmettoes

At the outset of our study we should recognize the circumstance that palmettoes are highly variable subjects. Thereby shall we save ourselves much trouble. Any person who has followed the saw, bush and cabbage palmettoes in their ranges and habitats in the United States is aware of this situation without going farther afield. Not only in stature and general habit but in cut and color of foliage, hang of leaves, abundance or scarceness of bloom, size of inflorescences and of the flowers themselves, are the differences apparent within the same species. Variation in size and shape of fruits, however, appears to lie within rather narrow limits, although this subject also requires further study.

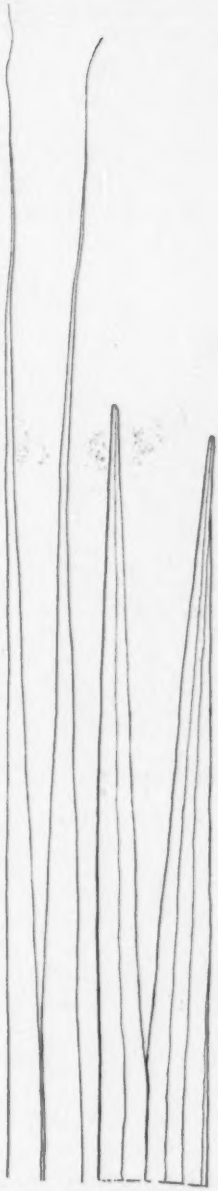

Fig. 162. Two bifid segment tips from one leaf of Sabal, lateral segment at left, central at right. About nat. size.

In this paper descriptions of the various palmettoes are not attempted, but diagnoses are drawn for the purpose of distinguishing the species. The palmettoes are summer-blooming plants, beginning frequently in late spring, and fruit is mature toward the end of the season and sometimes persists over winter or the equivalent season.

For the study of palmettoes it is futile to wait for the usual accumulation of specimens: a scheme must be presented, however imperfect, to define the kinds of materials that can make the genus understandable.

FIG. 163. SUBTERRANEAN TRUNKS of saw palmetto exposed by the blowing away of dunes. *Serenoa repens*. On Gulf of Mexico, near Port St. Joe, northwestern Florida.

Particular attention needs to be given to the identity of palmettoes planted in botanic gardens and private properties. They are a puzzling lot, probably not by reason of modification under cultivation but because they have not been really studied as well as because the wild species are not yet closely differentiated. The cultivated plants are likely to be easily passed under one name and another, but superficial observation cannot identify them. Persons interested in cultivated palmettoes should endeavor to find *Sabal umbraculifera*, *S. princeps*, *S. Blackburnia*. There are others, seen and collected by the author in tropical gardens, that cannot yet be confidently placed in any known species. Anyone who attentively scans this paper will not fail to note the disorder in the names of planted palmettoes.

This paper concerns itself with the consequences of the three generic names, Sabal, Inodes, Serenoa.

A. Seed oblong, raphal scar extending the length of it, micropyle on back toward or near one end: fruit oblong to pyriform: spathes or sheaths on main axis of inflorescence with broad ends that are blunt or bear only very short wide points: petiole spiny-serrate: leaf-blade palmate, without midrib, hastula very short showing on both surfaces: species one.....I. SERENOA

FIG. 164. CHARACTERISTIC STAND of low saw palmetto, *Serenoa repens*. Northwestern Florida.

AA. Seed circular as viewed from top or bottom, depressed or flattened, raphe short in slight basal cavity, micropyle lateral: fruit on the globular order although sometimes narrowed toward base: spathes on main axis terminating in narrow-acute or acuminate tips or blades: petiole unarmed: leaf-blade with a midrib even though very short, hastula on upper surface only: species many.....II. SABAL

I. **SERENOA**, J. D. Hooker, in Bentham & Hooker Genera Plantarum, iii, 926, 1228 (1883).

Low palms, mostly not tree-like, bearing true palmate leaves on tooth-margined petioles and axillary long branching heavily blooming inflorescences: flowers hermaphrodite; calyx tubular; petals 3; stamens 6, with versatile anthers; pistil of 3 carpels, only one of which commonly matures to fruit: seed single, as heretofore described.

Serenoa repens, Small, in Journ. N. Y. Bot. Gard. xxvii, 197 (1926). SAW PALMETTO. Figs. 148, 153, 160E, 161C, 163, 164, 165.

Corypha repens and *C. obliqua*, Wm. Bartram, Travels, 61 (1791).

Chamærops serrulata, Michx. Fl. Bor.-Amer. i, 239 (1803).

Sabal serrulata, Schultes & Schultes, Syst. Veg. vii, 1486 (1830).

Brahea serrulata, Wendl. in Kerchove, Palmiers, 235 (1878).

Serenoa serrulata, Nichols. Ill. Dict. Gard. iii, 423 (1887).

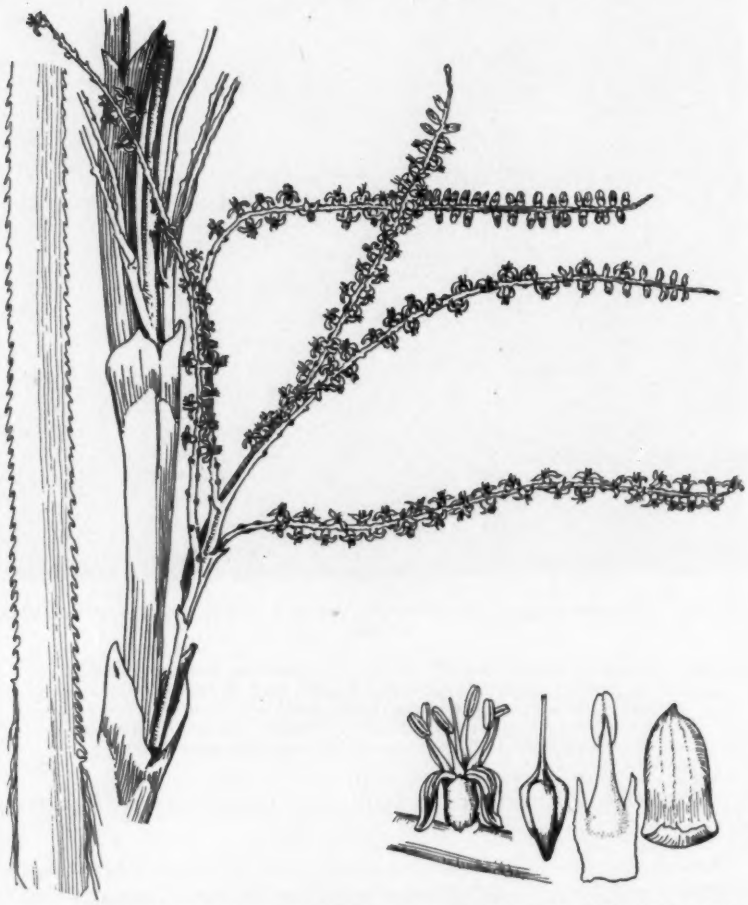

FIG. 165. DETAILS OF SAW PALMETTO. *Serenoa repens*. Piece of petiole at left. Side-cluster of flowers (×¾). Flower ×3. Pistil, stamen, petal ×5. Stamens are connate at base, indicated in the lower cut by the prongs of side tissue torn away.

Commonly acaulescent, gregarious, forming extensive dense colonies, caudex usually horizontal (Fig. 148) and shallowly subterranean but sometimes erect or oblique to 6 or 7 m. and the plant then arboreous with a slender rough trunk, frequently the caudices making conspicuous branching exposed tangles in boggy places: leaves palmate without continuing costa or rib, green, yellowish-green or glaucous, orbicular in outline, flat, 1 m. or less across, palman comprising one-fourth to one-third or more length of the blade; petiole usually slender, connecting at expanding base with extensive brown web or fabric, often much exceeding the blade in length, convex on under face and nearly or quite plane above, thin margins closely spiny-toothed although in exceptional cases the teeth may be nearly or quite wanting, hastula a membranous short almost scale-like structure showing on both faces of the base of the blade; segments 9-12 on either side, mostly firm and stiff but infrequently loosely hanging, midnerve prominent and often a conspicuous secondary nerve either side and several tertiary veins, 3 cm. or less broad at base, split 6-20 cm. or more at apex into narrow pointed lobes: inflorescence usually not exceeding the leaves, comprising a reddish-brown main axis less than 1 m. long which bears loose sheaths with 2 broad muticous or only very short-pointed sheaths, side-clusters many and mostly once-branched, the pubescent rachillæ profusely flowered and strongly divaricate or drooping: flowers (Fig. 165) nearly or quite sessile, 5-6 mm. long, short-toothed calyx tubular-terete, petals exceeding calyx and reflexed in anthesis and bearing calluses on the inner face, filaments broadened, anthers prominent: fruit variable in size and shape, drupe-like with prominent mesocarp, oblong to more or less pyriform, 16-25 mm. long and 12-15 mm. thick, black or bluish, edible and likely to be taken by animals; seed contained in an inner shell, oblong with shortly narrowed ends, 18 mm. or less long and about one-half as thick, light brown, glabrous and dull, lengthwise raphal scar prominent, micropyle depressed-circular as in Sabal, located on back or top past the middle, or near one end as in Fig. 161.

Synspecies, widely variable under differing conditions and presenting temptation to recognize specific segregates, but the marked forms appear to have no continuity or consistent natural ranges. It is the most abundant of the native species in the United States although of less range than *Sabal minor*. It occupies surprisingly various habitats, from sand plains and dunes, both dry and wet woods, pine barrens, prairies, to stiff lands, swamps and hammocks, from South Carolina to the Florida Keys, westward to about central Alabama and western Mississippi, often covering miles of territory with a continuous scrub in its prevailing low compact form (Fig. 164); recorded from islands in southeastern Virginia (Weatherby and Griscom, Rhodora, xxxvi, 31), and in North Carolina (Coker and Totten). Type locality, Saint Simon Island, Georgia, as indicated by William Bartram.

II. **SABAL,** Adanson ex Guersent in Obervations sur le Sabal d'Adanson, Bull. no. 87 des Sciences, par la Société Philomatique, 205, t. xxv Paris (1804).

Low or high palms, mostly the latter, with entire-margined petioles: flowers hermaphrodite; calyx variously tubular; petals 3; stamens 6, with long or short mostly versatile anthers; pistil of 3 carpels, of which only 1 commonly matures: seed single, of the character already described.

First definite technical botanical account of the plants we now know as Sabal is by Nikolaus Joseph von Jacquin, in Hortus Botanicus Vindobonensis, Vienna, 1776, under the name *Corypha minor* (as previously noted), although John K. Small (Journal of the New York Botanical Garden, xxiii, 161, 1922) cites a recognizable description in a journal kept by John Bartram, 1765, under the name *Chamærops humilis* on the supposition that it was the same as the Mediterranean palm of that name. Jacquin states that the palm flowered in the Imperial Garden at Schoenbrunn before 1773, having been grown by Richard van der Schot, distinguished gardener ("hortulano eximio"). His extended colored plate is an excellent representation of the bush swamp palmetto, even to the split in the leaf-blade.

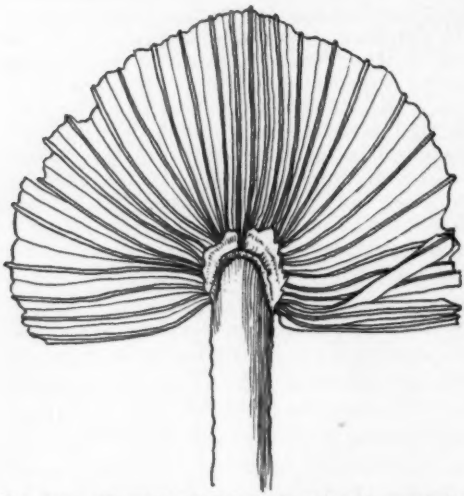

FIG. 166. HASTULA of *Sabal minor* (×⅔), remainder of leaf-blade having been cut away.

The paper of Guersent, cited in the Sabal caption, first put the plant definitely in the genus Sabal, stating it to be the plant intended by Adanson, an assumption verified by a photograph in hand of Adanson's excellent herbarium specimen still preserved in Paris. Guersent saw the plant in the botanic garden in Rouen; he knew Jacquin's account, as well as others. He has a good description; also an inadequate picture but sufficient to indicate the bush palmetto of the southern United States.

I. Subgenus EUSABAL, Small, Manual Southeastern Flora, 239. Leaf-blade flat and quite or nearly palmate, the costa if any weak and only 2-4 dm. long and not constituting a strong structural axis, tending to split into two parts with age; hastula under 6 cm. long and rounded or at least bluntish: inflorescence erect and overtopping leaves although eventually curving or arching with weight, side-branches nearly or quite simple (or at least not conspicuously compound) and not drooping.

A. Blade of leaf without a midrib or costa: plant lacking visible trunk or caudex. Southern United States.....1. *S. minor*

AA. Blade with weak costa extending perhaps one-fourth or one-third its length: plant in age developing a prominent trunk.

B. Segments of leaf, or at least the laterals, with weak hanging ends. Southern Mexico.....2. *S. mexicana*

BB. Segments stiff, not hanging over or deflexed at the ends. Louisiana. .....3. *S. Deeringiana*

II. Subgenus INODES, Small, l. c. Leaf-blade costapalmate,—bearing a long-continued strong costa or rib from which the successive segments arise, neither flabellate or pinnate, arched downward in a characteristic curve (not shown in usual herbarium material); hastula extended and pointed: inflorescence horizontal or soon becoming so or drooping, involved in the leafage, bearing elongated diffuse lateral branches carrying few or many flowering (and fruiting) drooping elements.

A. Hastula very small, 3-4 cm. or even less long: plant without above-ground trunk. Florida.....4. *S. etonia*

AA. Hastula large, long and prominent, 10 cm. or more, attenuate to apex: plant developing stout erect trunk.

B. The small-fruited tree palmettoes, the mature dry fruit 14 mm. or less crosswise.

C. Palman comprising one-third or more the length of the leaf-blade (i.e., blade not divided on all sides nearly to its base).

D. Fruits spherical or slightly ovoid, symmetrical, not perceptibly narrowed to base (unless in variants).

E. Segments of leaves deeply bifid, the two narrow lobes 2-6 dm. long or even more.

F. Spathelets (minor bracts) at base of secondary branches of inflorescence little if at all projecting beyond the inclosing spathe.

G. Axis of rachillæ angled or striate: hastula under 12 cm. long: leaves green, abundantly filiferous, segments narrow: trunk not columnar. Southeastern United States.....5. *S. Palmetto*

GG. Axis of rachillæ terete: hastula 15 cm. or more: trunk columnar.

H. Foliage green or gray-green: leaves very filiferous, Cuba.....6. *S. parviflora*

HH. Foliage glaucous: leaves only moderately filiferous. Nativity undetermined.....7. *S. umbraculifera*

FF. Spathelets long-exserted beyond the spathes that subtend and inclose the base of the secondary branches. Santo Domingo.....8. *S. neglecta*

EE. Segments undivided at apex. Santo Domingo.9. *S. domingensis*

DD. Fruits somewhat narrowed or tapered to base, or asymmetrical, or both (no. 11 in doubt; variants in no. 5 may be sought here).

E. Calyx strongly costate or ribbed lengthwise. Puerto Rico; perhaps Haiti.....10. *S. causiarum*

EE. Calyx very little if at all costate.

F. Flowers 4 mm. long. Guatemala.....11. *S. guatemalensis*

FF. Flowers 5 mm. long. Jamaica.....12. *S. jamaicensis*

CC. Palman very small or practically none, due to the deep laciniation of the leaf-blade.

D. Leaf prominently glaucous on under surface; some of the middle segments broad and dentate-lobed at end. Trinidad, northern South America; perhaps Central America....13. *S. mauritiæformis*

DD. Leaf green, not glaucous; segments with long-tapering end. Cuba, Yucatan.....14. *S. Yapa*

BB. The big-fruited tree palmettoes, dry mature fruit 15 mm. or more in crosswise diameter (partial exception in no. 17).

C. Fruit not exceeding about 20 mm. in transverse diameter.

D. Shape of fruit pyriform, or at least the base distinctly narrowed (usually as high as broad).

E. Mature seed mostly above 10 mm. broad.

F. Petals strongly costate outside: rachillæ not striate: narrowed base of fruit short: leaf-segments (or most of them) with very long narrow hanging points; filaments very long and mostly many. Planted, Texas. .....15. *S. exul*

FF. Petals not prominently costate: rachillæ striate: narrowed base of fruit one-third or more length of body: leaf-segments mostly not long-narrow-caudate and filaments or threads usually few and short. Bermuda. .....16. *S. bermudana*

EE. Mature seed 8-10 mm. across. Origin unknown...17. *S. princeps*

DD. Shape of fruit spherical or depressed (broader than high), only slightly and briefly if at all narrowed. (Forms of no. 15 may be sought here).

E. Inflorescences (spadices) distinctly shorter than petioles. Origin in doubt.....18. *S. Blackburnia*

EE. Inflorescences equalling or exceeding the petioles.

F. Foliage arrestingly glaucous-blue. Sonora.....19. *S. uresana*

FF. Foliage green.

G. Axis of rachillæ stout and angled: petals narrow, strongly costate outside, spreading in anthesis. Southern Texas, adjacent Mexico.....20. *S. texana*

GG. Axis very slender and terete: petals broad, thin, not conspicuously costate, reflexed in anthesis. Western Mexico.....21. *S. Rosei*

CC. Fruit about 27 mm. in transverse diameter. Central southern Mexico.....22. *S. Dugesii*

1. **Sabal minor,** Pers. Syn. Pl. i, 399 (1805). Bush Palmetto. Fig. 151; also 146, 159, 160, 161, 166.

Corypha minor, Jacq. Hort. Bot. Vindob. iii, 8, t. 8 (1776); Mayer, in Mem. de l'Acad. Roy. Sci. Berlin, 17 (1792; 1796).

Corypha pumila, Walt. Fl. Car. 119 (1788).

Chamærops acaulis, Michx. Fl. Bor.-Amer. i, 207 (1803).

Sabal Adansonii, Guers. in Bull. des Sci. Soc. Philomathique, Paris, 1804, 205, t. 25; Bot. Mag. t. 1434 (1811); Schultes & Schultes, Syst. Veg. vii, pt. ii, 1485 (1830); Martius, Hist. Nat. Palm. ii, 246, t. 103 (1838).

Rhapis acaulis, Willd. Sp. Pl. iv, pt. ii, 1093 (1805).

Sabal pumila, Elliott, Sketch Bot. S. Car. i, 430 (1821).

Sabal minima, Nutt. in Amer. Journ. Sci. ser. i, v, 293 (1822).

Chamærops sabaloides, Baldwin, in Reliquiæ Baldwinianæ, 334 (1843).

Sabal glabra, Sarg. Silva, x, 38 (1896).

Sabal acaulis, Hort.

Caudex or trunk very short (Fig. 146) and ordinarily not visible above the ground, more or less horizontal with erect apical part: leaves therefore arising from the ground, with long erect ascending or divergent petioles and flat fan-like blades bearing spreading long-pointed segments but no filaments, some of the blades eventually breaking down on one or both sides near the top of the petiole; petiole 3 dm. to 1 m. and more long, glabrous, under side convex, upper side more or less shallowly concave and more deeply so at lower end, base expanded to 8 or 10 cm. at union with trunk; hastula 1 or 2 cm. long, unequal-sided, irregular in shape, obtuse; blade 7-8 dm. long on robust plants and 10-12 dm. broad, usually bluish-green (not always so) but not glaucous, commonly becoming split near the middle almost to the base, the palman on either side about one-half length of blade or 8-15 cm. long, segments 20-30 and 5-10 dm. long, 1-2½ cm. broad and reaching below middle of blade, closely many-veined: flower-stems 2 to several to a plant, rising 1½-3 m., compressed particularly toward the base, erect at first but becoming more or less curved or arching, overtopping the leaves, slender and reed-like, the main shaft 2 cm. or less thick; sheaths (spathelets) 15 cm. or less long, the free extension not often exceeding 4 or 5 cm. in length and the point acute, the lower sheaths overlapping and sterile, the upper 10 or less more separated and bearing a short 6-10 cm. nearly or quite simple upright panicle with the peduncle short-exserted: flowers numerous and practically sessile on the slender glabrous rachilla in the axil of a short pointed bract, about 5 mm. across in anthesis, stramineous (Fig. 159): fruit a drupe-like globose body with nearly dry shell and thin mesocarp, 8-11 mm. diameter, black and glossy at maturity; seed 7-9 mm. broad and nearly as high, smooth, glossy very dark brown.

Swamps, river bottoms, hammocks, and other lowlands and pastures, southeastern North Carolina (reported in northeastern part) to southern Florida (but not on the Keys) to eastern Texas and southwestern Arkansas. In the northern limits of its extension it does not occur far from the coast. Bush palmetto often becomes a troublesome weedy plant in cultivated or reclaimed fields in parts of the Lower South. It has the most extensive distribution of the palms native to the United States. Type region, Carolina.

Dimensions in the foregoing diagnosis are taken both from plants in the wild and transferred to grounds. There are old horticultural races, however, long in cultivation in botanic gardens and elsewhere, that exceed these measurements in the vegetative parts, some of them being rather massive. These garden races are not understood, and it is not unlikely that some of them represent *S. Deeringiana*.

The bush palmetto is either widely variable, constituting a synspecies, or more than one specific type is involved within its range. Some years ago a form was sent to the United States Department of Agriculture by Professor C. S. Mason from northwest of San Antonio, Texas, and which has been somewhat distributed in test grounds under an unpublished name. A plant of it of bearing age, in a tub, is now to be seen in the Department greenhouses on 14th Street, Washington. The fruits are notably large, as

much as 13 mm. across. What appears to be another kind, from eastern Texas, is very dwarf, small-leaved and early-fruited, presenting quite a different aspect.

Apparently bush palmetto is widely planted, often under inapplicable names. From farther Asia it comes under the name *princeps* (see no. 17). In South America the author has collected it under the name *Brahea serrulata;* in another botanic garden the plant grown as *S. minor* is the tree now provisionally accepted as *umbraculifera*. Other plantings are discussed under Louisiana palmetto, no. 3.

2. **Sabal mexicana,** Martius, Hist. Nat. Palm. iii, 246 (1838). Oaxaca Palmetto.

Inodes mexicana, Standley, in Contrib. U. S. Nat. Herb. xiii, pt. i, 71 (1920), as to name.

Tree becoming 6-7 m. tall, trunk 10 cm. diameter ("Palma in 20 pedum altitudinem evehitur, caudicis diametro quadripollicari") but fructiferous even when still acaulescent, to be distinguished from *S. minor* in less blue foliage, texture thinner and laxer so that the segments (particularly the lateral ones) hang softly; leaf-blade, which is deeply bilobed in the middle, ovate-orbicular, although the rachis of it (costa or midrib) extends one-third its length; filaments in sinuses sometimes rather frequent or sometimes few: spadix 1 m. or more long ("tripedalis et altior"): flowers shorter and more fleshy: fruits somewhat larger than those of *minor*.

The above diagnosis is drawn from Martius and therefore is at variance with subsequent conceptions of *Sabal mexicana*. To understand the situation, one must review Martius' treatment of the genus.

The Sabals of Martius are three: *S. umbraculifera* (which we are soon to discuss) with a good portrait of inflorescence and flowers as well as a picture of a young tree in the volume of morphological studies; *S. Adansoni* (*minor*) with characteristic portrait of inflorescence and flowers as well as certain morphological features; *S. mexicana* without diagnostic portrait but supplemented by certain structural parts in the morphology volume. The first, *S. umbraculifera*, is a real tree palm, with continuing midrib, the blade costapalmate. The second, *S. minor*, is acaulescent with palmate leaf-blade. The third, *S. mexicana*, is compared only with *minor* excepting in the statement that the fruits are smaller than those of *umbraculifera;* its differences from *minor* are said to be small; it has palmate deeply 2-parted leaves, with rib extending one-third length of blade: all marks indicate Eusabal. The very slender trunk, as described, has puzzled subsequent botanists, but the plant was known to Martius in cultivation in Munich and it would not be strange if the bole were of unnatural dimensions when grown under glass in a northern climate and crowded with other plants. The picture of a leaf from a six-year-old plant in the presentation of the

morphology of palms, to show vernation (Historia, i, t. V, fig. iv) is Eusabal rather than Inodes; leaf-segments are about twenty.

Martius gives the habitat as maritime, at Chacahagua near Jamiltepec, and Tehuantepec, in Oaxaca. Karwinski presented fruits to the royal gardens at Munich. The specimens collected at Chacahagua were acaulescent but not less fruit-bearing than the others and otherwise the same.

Type specimens of Martius appear not to be available. Liebmann got it in 1842 at San Jago in Oaxaca near the sea; flowering pieces of his collection are in the Gray Herbarium and the National Herbarium in Washington, and they confirm the similarity to *S. minor*. Other specimens seen by the writer purporting to be *mexicana* are not the plant described by Martius, including apparently a Zuccarini specimen communicated by Beccari. The approach to the identity of *Sabal mexicana* must be radically modified, and rediscovery of the species, with new diagnosis, is much to be desired. We cannot yet say what are the palms in southern Mexico that subsequently and habitually have been called *S. mexicana*. Some of those so named in botanic gardens, however, are known. The *Sabal mexicana* of Sargent is *S. texana*, that of A. H. Curtiss and Sauvalle of Cuba is *S. parviflora*.

3. **Sabal Deeringiana,** Small, in Torreya, xxvi, 34 (1926); Journ. N. Y. Bot. Gard. xxx, 278-284, tt. (1929). DELTA OR LOUISIANA PALMETTO. Figs. 152, 154, 167.

Sabal? adiantinum, Raf. Fl. Ludovic., 17 (1817), probably.

Distinctively a tree when full grown, standing 5 m. and more high over all, the stout trunk more or less oblique at base and sometimes 2.5 m. tall and 2-3 dm. diameter inside the coverings, and with a horizontal or slanting subterranean part, the exposed mature gray or whitish bole becoming bare and marked only by rough indentations; petiole-bases splitting as trunk expands and densely overlapping, with scant fiber, often cohering as a more or less loose shell around the trunk until finally they fall but some of them likely to persist under the leaf-crown: leaves large, upper ones strongly ascending; petioles on large subjects 1 m. and more long, exceeding the blade, convex on under surface and concave with upturned thin sharp margins on upper face, 5-6 cm. broad above the expanded base; expanded blade nearly or quite flat when not broken down, to 2 m. across, either deep or yellowish-green, nearly orbicular or broad-oblong on younger plants, the palman occupying about one-third the length or 30 cm. and more long; hastula 3-5 cm. long and arrowhead-pointed but not attenuate; slender costa on the lower face evident part way up the palman; segments 30-40 or somewhat more on strong plants, long-attenuate and deeply bifid at the end into long sharp points, 3-5 cm. broad at base, finely many-nerved, sometimes accompanied by a few long filaments in the sinuses: inflorescence very long and stout, 4-7 cm. thick toward base, 4-5 m. long and towering straight above the foliage even after fruit has fallen; branches many and ascending, to 35 cm. and more long and lower ones very long, bearing several mostly once-branched secondary clusters; rachillæ terete with flowers evenly spaced and not crowded: flowers 5 mm. long, sessile, calyx

tubular-columnar at base, petals exceeding calyx and broader and more strongly nerved than those of *S. minor* and involute, filaments broad and anthers very short-sagittate: fruit depressed-globose, 8-12.5 mm. broad and 7-10 mm. high, black at maturity; seed inclosed in an integument, de-

FIG. 167. REPRESENTATIVE TREE of Louisiana palmetto, *Sabal Deeringiana*. Some of the leaves are broken over as in Fig. 152. Remains of old flower-stalks may be distinguished. Lake Pontchartrain, Louisiana.

pressed, about 8 or 9 mm. across and 6 or 7 mm. high, smooth, dark glossy brown at maturity, micropyle lateral.

Swamps and inlets in the eastern half of southern Louisiana, as far as yet definitely recorded, in many places and often in extensive stands even though long botanically overlooked; a striking palm when full grown and in flower or fruit. There are indications that it occurs eastward of Louisiana. Type habitat, along Lake Pontchartrain, Louisiana. The rediscovery or recognition of this palm in 1925 by John K. Small was a striking contribution.

This interesting palm has been the subject of extensive field study by Dr. Miriam L. Bomhard, one of whose papers on it is soon to appear in the Journal of the Washington Academy of Sciences.

Louisiana palmetto is not well understood. Whether true *S. minor* develops a decided bole in the southern limits of its range is apparently an open question. How *S. Deeringiana* is to be positively distinguished in its juvenile state from *S. minor* is not clear, but the number and width of leaf-segments, length of the palman and the hastula, should provide useful indications. Many palms of clearly separate species, or even of different genera, are scarcely distinguishable in the young state.

There are many indications that *S. Deeringiana*, or a similar species, has been long in cultivation, as suggested in the discussion of *S. minor*. It would not be strange if seeds were early distributed from the New Orleans area; or some of these cultivated plants may be *S. mexicana;* and it is not impossible that unrecognized species are involved.

Plants of the *Deeringiana* relationship have been taken in gardens in California, Trinidad, Demerara (British Guiana), Brazil, and specimens from Singapore are similar. *Sabal speciosa*, an unrecorded name, taken in the Montecito gardens of J. W. Gillespie, southern California, is much like *Deeringiana;* the hastula is 5 cm. long, 2 cm. broad at base, long-narrowed and bluntish: fruit 13 mm. or less broad and 10 mm. or less high, depressed-globose, frequently 1 or 2 other carpels developing to some size; plants came from an eastern nursery which is said to have obtained the seeds from Brazil.

As *Sabal havanensis* a similar palm is in the botanic gardens at Gavea, Rio de Janeiro. This name *havanensis* is of long usage but without botanical standing. It apparently started with Loddiges, English nursery firm, and has been passed down through the literature without description. Martius picked it up in the third volume of his Historia (1850; p. 320) in a note under Thrinax as one of the things listed by Loddiges in 1849. Kerchove merely lists it in Les Palmiers, 1878. Beccari (1907) does nothing more than to cite it. The name is still current, and seeds may be had of European seedsmen. Leaf specimens sent to the writer as *S. havanensis* from southern Florida are an Inodes.

4. **Sabal etonia,** Swingle ex Nash, in Bull. Torr. Bot. Club, xxiii, 99 (1896). Scrub Palmetto. Figs. 147, 159, 168.

Apparently acaulescent but the top borne on the crown of a subterranean trunk which is doubled against itself in vertical folds or loops with many cord-like roots arising from its lower sides and under surface as exhibited in Fig. 147, the total length sometimes being several feet: leaves 4 or 5, standing 1-2.5 m. high, part of them erect and others spreading, petiole about equalling the blade; petiole 1 m. and more, slender, 3 cm. or less broad, convex on under surface, flattish or slightly concave and with a central ridge on upper face; hastula small, 4 cm. or less long, pointed, margins plane or uprolled; costa strong and continuing through the blade, the leaf therefore costapalmate and decurved in form; blade green, conspicuously filiferous, 1 m. and more across, palman occupying about one-fourth the length; segments 30 or more on either side on large strong leaves, widespreading or the lateral ones drooping, 7-9 dm. long, central ones 3-4 cm. broad at base, others much narrower, all long-bifid and terminating in slender caudate points, main rib prominent, secondary veins many and fine: inflorescence shorter than leaves, much branched, nodes short, becoming horizontal or prostrate, sheaths with acuminate points; rachillæ 3-8 cm. long and closely flowered: flowers 5 mm. long in anthesis, with broad erect-spreading petals somewhat shorter than the thick anthers (as in Fig. 159): fruit globose and only slightly depressed, 12-15 mm. broad and 1-2 mm. less in height, dull black, shell firm; seed depressed, not cavitous at base, 8-10 mm. or more across and three-fourths as high, contained in an inner integument, shining very dark brown, micropyle lateral and very small.

Peninsular Florida on sands and dry scrub lands. Type station in the Etonia scrub near Eustis.

Identity of *Sabal megacarpa,* Small, Flora Southeastern United States, 223 (1903), which is *S. Adansoni* var.? *megacarpa,* Chapman (Flora Southern United States, 3rd ed., 462, 1897), is not yet clear. The plant is supposed to be a larger-fruited palm than *S. etonia,* and there are indications of such a species in southern Florida. Chapman's description calls for a fruit ⅓ inch in diameter, which is small for *etonia:* "leaves grayish green, the divisions parted nearly to the sinuses; spadix (2 ft. long) ascending, prostrate." Its habitat is given by Chapman as dry rocky pine woods, Miami, which is not the soil condition usual for *S. etonia.*

5. **Sabal Palmetto,** Lodd. ex Schultes & Schultes, Syst. Veg. vii, pt. ii, 1487 (1830). Cabbage Palmetto. Figs. 145, 149, 150, 155, 158, 160, 161, 169, 170, 171.

Corypha Palmetto, Walt. Fl. Car. 119 (1788).

Corypha Palma, Wm. Bartram, Travels, 61 (1791).

Chamærops Palmetto, Michx. Fl. Bor.-Amer. i, 206 (1803); Willd. Sp. Pl. iv, pt. ii, 1155 (1805); Pursh, Fl. Amer. Sept. i, 240 (1814).

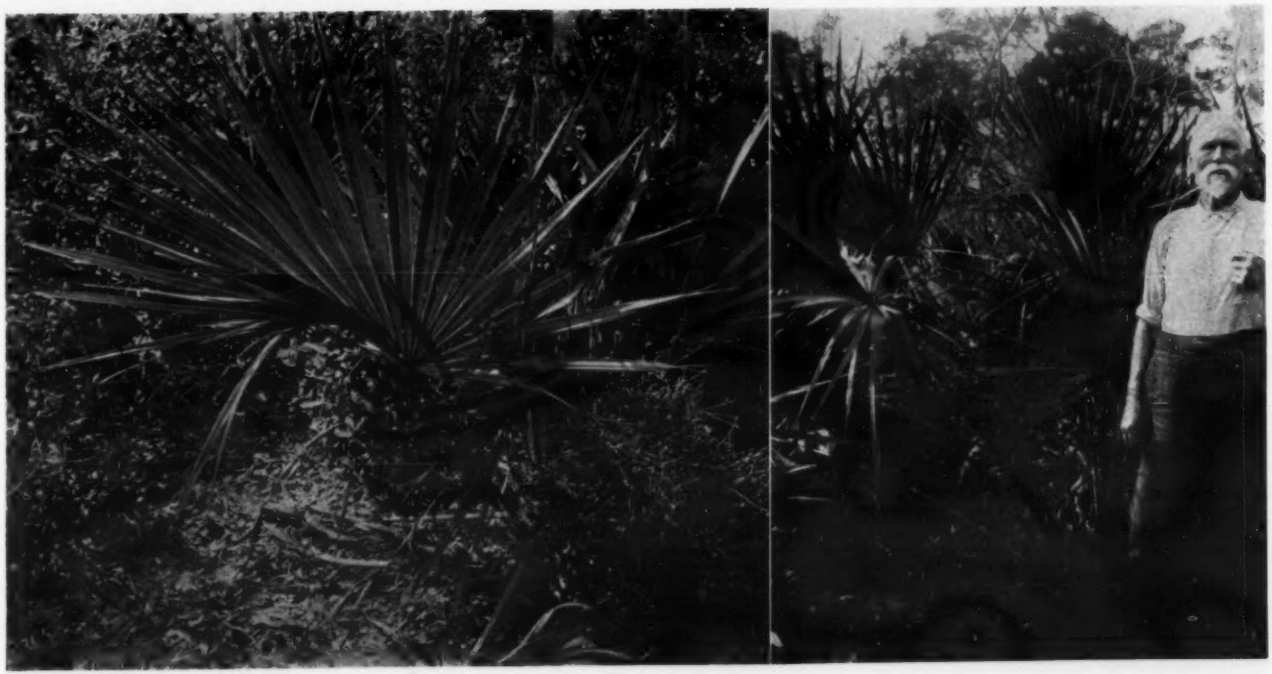

FIG. 168. REPRESENTATIVE GROUPS of scrub palmetto. *Sabal etonia*. One at left has a flower-cluster at lower right. The late Charles Torrey Simpson standing. Central and southern peninsular Florida.

Inodes Palmetto, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 532 (1901).
Inodes Schwarzii, O. F. Cook, l.c.
Sabal Schwarzii, Becc. in Webbia, ii, 39 (1907).

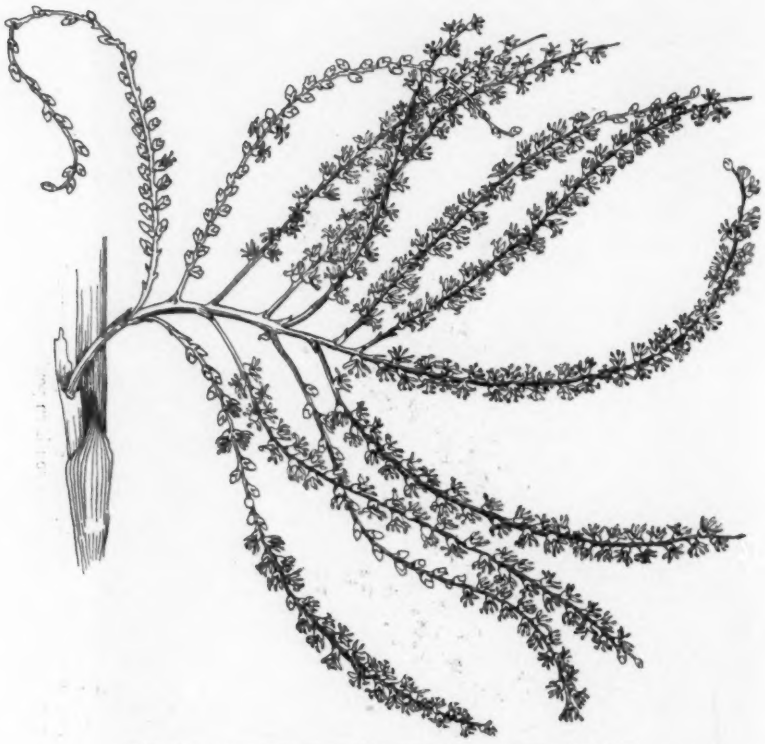

FIG. 169. SIDE-CLUSTER of flowers of *Sabal Palmetto* (×¾).

FIG. 170. FLOWER DETAILS of three palmettoes. Flowers (×3). Pistils, stamens, petals (×5). A, Flower and three parts of *Sabal Palmetto*. B, Same of *Sabal jamaicensis*. C, Same of *Sabal Yapa*.

Tree of short or very tall trunk depending on region and conditions as well as age, to 20 m. or more and then with a slender look; criss-cross of old petiole-bases sometimes long-persisting the whole length of the trunk, sometimes in the same stand shed early and the bole therefore bare (Fig. 145); head of foliage globular, particularly on old tall trees, with characteristic look due to the green color and many very narrow long hanging segments and abundant filaments, the flower-stems lying between the leaves and equalling or sometimes a little exceeding them, old dead stems of which often persist a year or two: leaves extending in all directions, various in size and shape and in relative lengths of petiole and blade as well as width

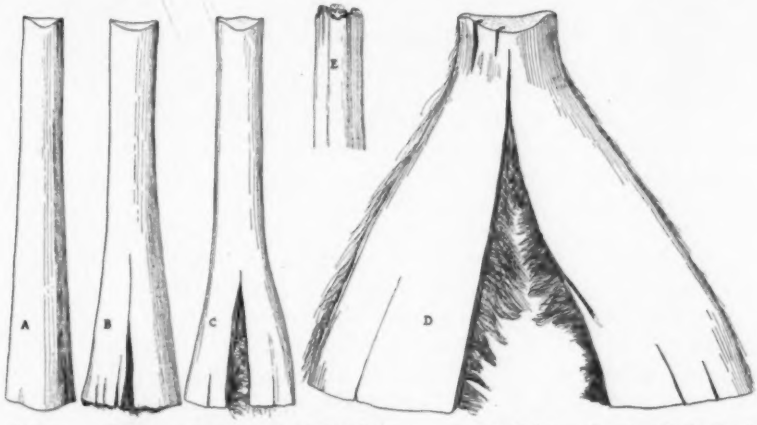

FIG. 171. PETIOLE BEHAVIOR in *Sabal Palmetto*. A, petiole-base of young leaf. B, C, stages in split of the petiole with expansion. D, old split or bootjack. E, natural break of petiole midway or near the apex, when leaf dies. Sometimes the entire petiole, with the blade, falls after hanging dead and dry.

of segments; petiole usually exceeding the blade, sometimes in overshadowed places as much as 3 m. long while the blade may be less than 2 m. long, relatively flat but somewhat convex on lower side and middle-ridged on upper side above the basal part, the edges not prominently upturned, to 10 cm. broad at the base above the much expanded bootjack formed by the expansion of the trunk; hastula to 10 cm. long, gradually narrow-pointed, free edges upstanding or sometimes inrolled; leaf-blade 1-2 m. long and usually about one-third broader, curved the entire length; segments pendent, 30-40 or more either side the costa on large leaves and as much as 50-70 cm. long above the palman, split about one-third the length into 2 very narrow pointed lobes or ends, 4 cm. or less broad toward base and long-tapering, closely many-veined, usually a slender and mostly very long filament in each main lower sinus: inflorescences long, some of them upstanding in the top of the tree but most of them horizontal or drooping, side-clusters (Figs. 158, 169) developed into compound branches ½-1 m. long; sheaths (spathelets) on the main axis with long narrow points: flowers multitudinous, stramineous, sessile and subtended by a bract, about 5 mm. long, rachillæ glabrous and angled, the flower-parts as in Fig. 170: fruit

typically globular or essentially so, mostly not tapering at base, 7-12 mm. diameter, shining black at maturity; seed depressed, about 6 mm. across, smooth, shining dark brown when ripe.

Synspecies, running into numberless aspects but still fairly homogeneous within itself even though the shade forms may seem at first sight to be distinct. It occurs in four states,—southeastern North Carolina (Smith and Middle Islands, Cape Fear), coastal region of South Carolina and Georgia, throughout peninsular Florida to the southern tip (Flamingo), lower Keys, and northwestward to St. Andrews Bay in Bay County (near Panama City); it is commonly planted in its region. It sometimes blooms when only a few feet high and may then look like a different palm. Original region, in nomenclature, Carolina.

S. Palmetto var. **bahamensis,** Becc. in Webbia, ii, 38 (1907).

Trunk exceeding 5 m. tall, fruits and seeds somewhat larger, segments of the larger leaves less deeply divided at the end.

Bahamas: New Providence and Hog Island. Britton and Millspaugh in the Bermuda Flora do not separate this plant from *S. Palmetto;* and Small states (Journ. N. Y. Bot. Gard. xxiv, 158) that "the Sabal of the Bahama Islands is apparently identical with that of the south Atlantic mainland." The writer has no original opinion whether the Bahama palmetto is identical with the continental plant or is a distinct variety or species, as he has not collected it. Such specimens as have been seen do not disclose important differences, but this has little significance.

There appear to be no modified horticultural races of *Sabal Palmetto.* A garden name listed by Index Kewensis as of 1907 is *S. longepedunculata* (nomen), but without description. There is a fruiting tree under this name in the Huntington gardens at San Marino, California: it is *S. Palmetto.*

The big palmetto of the United States is sometimes called Cabbage-tree, in allusion to the edible cabbage or bud in the crown, but other palms, particularly Roystoneas, are also so called and provide a similar food. Trunks of palmetto are used in piling and in various construction and the tree yields other parts employed in home work. A palmetto emblem is on the seal of South Carolina, which is called the Palmetto State.

Trunks of palmetto are interestingly diverse in bulk, shape and general aspect. Old tall ones are seldom straight and uniform. They are variously ringed, differently lengthwise chinked and fissured. The fibrous core is contained in a thick hard resounding shell. Boles are reported two feet and more thick.

Stages in the senescence of the petiole in *Sabal Palmetto* are disclosed in Fig. 171. At A is the normal petiole-base of a young leaf or tree. With the expansion, it soon splits as in B and C. At D is the bootjack of an old leaf, now dead, an element in the criss-cross on the trunk shown in Fig. 149; in this case (Fig. 149) the old petioles have been sawn off to improve the

looks of the bole, so that the halves of the bootjack are wholly separate in most cases. In nature the dead leaves do not break so uniformly and cleanly. If one observes a trunk in the wild one will find the petioles broken at different lengths, sometimes leaving stubs 2 feet or more long, and the end will show the natural break as in E of Fig. 171. The spread at the base of the old petiole, D, uncovers coarse brown fiber, the amount of which differs in separate trees.

It is not to be inferred from the foregoing treatment of *Sabal Palmetto* that the author supposes this palm to be botanically understood. Much work still needs to be devoted to it, and particularly the fruit characters require correlation.

FIG. 172. DETAILS OF TWO PALMETTOES. Flowers ×3. A, *Sabal causiarum*, with pistil, stamens, petal (×5). a, Fruit of *S. causiarum* not yet full grown, about natural size, showing remains of pistil. D, *Sabal parviflora*.

An interesting problem presents itself in *Sabal Jamesiana* described by John K. Small in 1927 (Journ. N. Y. Bot. Gard. xxviii, 182). It is a short-trunked palm of the Everglade Keys in southern Florida, characterized by relatively short drooping leaf-segments with the palman flat, and a straight midrib lacking the downward curve so characteristic of *S. Palmetto*. Trees of it, on which the species was founded, were seen in a hammock west of Kendall, James hammock on Snapper Creek, Deering hammock at Cutler, all near Miami to the south. It is recorded as a shy bloomer. In 1929 the author took this plant in the Cutler hammock and two years earlier had seen a similar palm in a hammock in the Snapper Creek area. They were all low plants with very short trunk, growing in dense hammock shade, without signs of flowering or fruiting. The leaves had the characteristic long and flat palman and segments hanging from the end and sides, much as in Small's diagnosis and in his picture of the Kendall plant. This year, 1934, the writer visited the original tree in the Kendall hammock under guidance of Charles A. Mosier. Apparently *S. Jamesiana* is one of the many juvenile forms of *S. Palmetto*, arrested in development by the conditions under which it grows.

6. **Sabal parviflora,** Becc. in Webbia, ii, 43 (1907); Palms Indigenous to Cuba, Pomona Coll. Journ. Econ. Bot. ii, 375, t. 15 (1912). CUBA PALMETTO. Figs. 172, 173.

Stout tall tree usually with massive gray irregular trunk to 15 m. or more, head or crown globular and rather dense, the foliage with a stiff and light or grayish-green aspect, the segments mostly not hanging, clusters about equalling the leaves: petiole equalling or exceeding blade, 1 m. and more, much expanded and eventually splitting at base, roundly concave on lower face and broadly convex with upturned thin edges and very low central ridge on upper face, the base often bearing shreds or ribbons; has-

FIG. 173. SMALL TREES, but in bearing, of Cuba palmetto. *Sabal parviflora*. Sierra del Rosario region of western Cuba.

tula long-attenuate with upstanding rolled edges, 15-25 cm. long; mature blade heavy and large and stiff, 1 m. or more long and broad, very filiferous on most trees, palman relatively small and often only one-fourth or less total length; segments very many, relatively narrow, 4-5 cm. or less wide at base, split as much as 12-14 dm., points long-narrow and the side ones at least terminating in long thread-like points, midnerve strong and other nerves close and fine, cross-veins sometimes noticeable: inflorescence stout, 1-2 m. long, much branched, main stock or axis terete and 2-3 cm. or more thick, sheaths prominently pointed; rachillæ 6-15 cm. long, either sparsely or compactly flowered, nearly or quite terete and glabrous: flowers variable in size, 3-5 mm. long, sessile, calyx very short, petals narrow and blunt and widely spreading or nearly horizontal in anthesis, short anthers exposed: fruit globose, only very slightly if at all tapered toward base at maturity, symmetrical, 9-14 mm. across and 10 mm. or less high, brown-black and shining when ripe, variable in size on the same tree; seed contained in a thin membrane, 8-11 mm. across, depressed, very dark brown to black and shining, micropyle small.

Cuba, hillsides, fields and forests, Pinar del Rio to Oriente; Isle of Pines (type region).

In *Sabal parviflora* the writer includes at present *S. florida*, Becc. in Webbia, ii, 46 (1907), and Palms Indigenous to Cuba in Pomona College Journal of Economic Botany, ii, 376 (1912), although without asserting that there may not be basis for separation. The most positive distinction between *parviflora* and *florida* stated by Beccari is in dimension of flowers, but intermediate sizes are frequent, other characters appear not to be correlated with flower size, and flowers of Sabals are distinctly variable as one who observes *S. Palmetto* is well aware. Variation in size of fruit in the *parviflora-florida* group seems to be independent of floral measurements. Beccari did not know the fruit of *S. florida*. It has been suggested that cross-veining on the leaves is marked in one of the supposed species and absent in the other, but examination of a long series of specimens has not confirmed it. There is supposed to be a distinction in the mode of branching of the inflorescence, but such difference requires careful observation of many complete flower systems for verification. Now and then a very large-fruited palmetto is seen in Cuba; fruits in hand from a station in Santa Clara, are 16 and 17 mm. across and narrowed to base, but whether from a native or introduced tree is not indicated; the meaning of these various occurrences cannot be known until good materials of flowers and fruits and leaves from the same tree, together with photographs, are available. If the two specific names are combined, the range of variation is still much less (as far as we can judge from present evidence) than in *S. Palmetto* in the United States. Yet it is not unlikely that another species is on the savannas and with Copernicias in Camaguey and Oriente.

Full distinctions between *S. parviflora* and *S. causiarum* are yet to be uncovered, but the flowers (Fig. 172) and fruits show good differences

although a single fruit of either one chosen from a quantity may not be sufficient for identification.

Cuba palmetto is planted in Florida, and is likely to pass as *Sabal causiarum*.

7. **Sabal umbraculifera,** Martius, Hist. Nat. Palm. iii, 245, t. 130 (1838), and vol. i, t. Y figs. 5, 6, 7. UMBRELLA PALMETTO.

To 14 m. and probably more, with erect cylindrical trunk scarcely 3 dm. diameter and 8 m. tall which becomes bare but with ringed scars, the subglobose head composed of 20-30 large leaves which are glaucous with greenish-white along costa: petiole 2 and more m. long, strongly convex on lower face, concave on upper face, with sharp margins, fibrous at base; hastula triangular and with sharp ascending margins; mature leaf-blade to 2 m. long, decurved, with about 80 segments; segments long-acuminate, the apex more or less deeply bifid, palman one-third or more length of blade, filaments or threads slender and becoming deciduous, midnerve prominent, secondary nerves numerous and close: inflorescence 1.5 m. or more, twice shorter than the leaves, with paniculate branches, spathes or sheaths semi-amplexicaul and with ovate-triangular ends, rachillæ loosely flowered, 8-10 cm. long: flowers greenish-white; filaments of stamens subulate and equalling the corolla, anthers cordate-ovate: fruit globose or depressed-globose, about 10-11 mm. diameter, greenish-black, glabrous and shining, with thin flesh; seed hemispherical, cinnamon-brown, shining.

The binomial *Sabal umbraculifera* has been a floating name, applied vaguely or loosely to several palmettoes. Yet it has definite botanical beginning in Martius, with good Latin diagnosis and two useful plates. Martius cites the *Corypha umbraculifera* of Jacquin, but not of Linnæus, as a synonym, as also *Sabal Blackburniana* of Glazebrook. What other authors may have meant by *umbraculifera*, as Grisebach in Flora of the British West Indian Islands, does not concern us here. We must first consider the Jacquin reference.

In his Fragmenta Botanica, 1809, page 12, Jacquin has an account of *Corypha umbraculifera*, Linn. The plant he supposed to be the Linnæan species was growing in the garden at Schoenbrunn near Vienna, having been introduced from Holland in 1753. He gives the nativity as Malabar; Linnæus in Species Plantarum accredits *Corypha umbraculifera* to India, where it is a well known palm. Jacquin wrote when palms were not closely distinguished. The identity of the Schoenbrunn palm cannot be made out from his account. It is to be noted that he makes no suggestion of an American origin.

When Martius compiled his colossal work on palms, he apparently studied the plant in the Schoenbrunn gardens, referred it to the genus Sabal as *S. umbraculifera*, and stated that it grew commonly in Haiti and Cuba and other Carribbean islands, and that it was called Palma de Cana and de Sombrero. The plant described by Martius has nothing to do with

the Asian *Corypha umbraculifera*. How he knew that the Schoenbrunn palm was Haitian and Cuban is not disclosed; and it is to be remembered that the palms of tropical America were then little understood so that misidentification was prevalent. However, as Martius gave a real diagnosis and good portraits we must accept his *Sabal umbraculifera* quite independently of anything that Jacquin wrote or of precise nativity; of course his plant, being a Sabal, is American. Martius well knew that *Corypha umbraculifera* of Jacquin was not the same as *C. umbraculifera* of Linnæus, for in the same volume he describes and figures the latter species (iii, 232, t. 108, t. 127 fig. 2). The binomial *Sabal umbraculifera* is valid for the American plant.

It now remains to attempt identification of Martius' palm in terms of present knowledge. Authors subsequent to Martius have made *Sabal umbraculifera* a synonym of *S. Palmetto*, and this is the current disposition of it. This reference began before the West Indian palmettoes were differentiated and when it was assumed that *S. Palmetto* ranged in that territory. To Martius himself *Sabal Palmetto* was only a doubtful name. The situation today is very different, when more than a half dozen West Indian Sabals have been separated, and when *S. Palmetto* is known not to range beyond the continental United States unless possibly in some of the Bahamas. It is time, therefore, that the case of *S. umbraculifera* be reviewed.

The Martius portrait of inflorescence and flowers of *S. umbraculifera* does not suit *S. Palmetto*. Fruit had not been seen by him but was described from reports and consequently lacks the definiteness required in contemporaneous work. It is, therefore, impossible to key the species with precision. The closest affinity appears to be with *S. causiarum*, which to this day is known as Palma de Sombrero. It would be strange if the hat palm had not received a botanical name until Cook described it as *Inodes causiarum* in 1901.

Umbrella palmetto is probably to be identified first in cultivation, and this will give clew to the wild plant wherever it may be. The writer provisionally identifies as *S. umbraculifera* attractive palms he has seen in the Huntington Gardens in southern California under a number; in Trinidad Botanic Gardens, B. W. I., planted as probably *Palmetto* and another grown as *umbraculifera;* in Botanic Gardens in British Guiana as *minor* and *mauritiæformis;* in parking in Botafogo, Rio de Janeiro. These are columnar trees with trunk soon becoming bare and light gray and showing rings, head dense in age, foliage with a glaucous or blue cast, hastula prolonged, filaments only moderately evidenced, small globular fruit (about 10 mm. across) and abundant.

Specimens from palms grown in southern Florida as *S. umbraculifera* are *S. Deeringiana* or its relatives.

FIG. 174. HAT PALMETTO, some of the leaves having been lopped. *Sabal causiarum*. Punta Borinquen, Puerto Rico.

8. **Sabal neglecta,** Becc. in Webbia, ii, 40 (1907).

Leaves large, deeply many-segmented; segments more than 1 m. long and 4 cm. broad at base, deeply bifid into very long caudate points: inflorescence large, the side-clusters 20 cm. long with basal spathe or sheath from which the secondary spathes are long-exserted, rachillæ about 10 cm. long and filiform and only obscurely angled: fruit spherical, not attenuate to base, 12-13 mm. diameter; seed 8-9 mm. broad and 6 mm. high, micropyle small.

Santo Domingo. Described from a specimen of Jacquemont dated 1827.

9. **Sabal domingensis,** Becc. in Webbia, ii, 49 (1907).

Of medium height: leaf-segments undivided at apex: branches of inflorescence dense, somewhat cypress-like; rachillæ corrugated and somewhat angular, 5-6 cm. long, densely flowered: flowers 4 mm. long in bud, calyx costulate: fruit 13-14 mm. in diameter, base scarcely narrowed; seed 9-10 mm. broad and 6.5-7 mm. high, micropyle small.

Santo Domingo; Gurabo near Santiago; on savanna at Guiana Moca.

10. **Sabal causiarum,** Becc. in Webbia, ii, 71 (1907). HAT PALMETTO. PALMA DE SOMBRERO. Figs. 160, 172, 174, 175.

Inodes causiarum, Cook, in Bull. Torr. Bot. Club, xxviii, 531 (1901); Contrib. U. S. Nat. Herb. viii, pt. ii, 167 (1903); Urban, Fl. Portoricensis (Symb. Antill. iv), 127, 154 (1903).

Inodes glauca, Dammer in Urban, l.c. 127.

Comely tall tree with columnar gray trunk to 15 or 16 m. high that becomes nude and smooth with age, to 2 m. or more in girth; head more or less globular, at least in old trees, with an open or thin look due to the long petioles that stand in all directions, the large leaves with the characteristic palmetto curve, flower-clusters often projecting beyond the foliage: petiole 1 m. and more long, roundly convex underneath, concave or trough-like on upper side from the upturned margins (at least toward base) and obscurely ridged in upper half, bottom part bearing many shreds and fibers or even segment-like extensions; hastula to 15 or 20 cm., long taper-pointed, margins often conspicuously upturned; costa very strong and continued through the leaf-blade; blade usually bright green and slightly duller but not glaucous underneath yet in some stands or trees noticeably glaucous-blue (*Inodes glauca*) but otherwise not different, 1½-2 m. long and of equal or greater width, prominently filiferous, palman comprising about one-third the length; segments 25-30 or more on either side, 3-5 cm. broad at base, firm or stiff except the long narrow grass-like ends, finely parallel-veined: flower-cluster long and profusely branched, the main axis provided with elongated points to the large sheaths (Fig. 8, Gent. Herb. iii, fasc. i, p. 14), the ultimate axes bearing prominent sheaths; flowers white, slightly fragrant, sessile, about 4 mm. long, petals strongly ascending in anthesis as shown in Fig. 172; rachillæ glabrous and nearly or quite terete: fruit globose-short-tapering and mostly asymmetrical at maturity, dark brown and smooth, 10-12 or 13 mm. diameter and 10 or 11 mm. high; seed depressed, 9-10 mm. across and three-fourths as high, dark glossy brown at maturity.

Puerto Rico, in lower valleys and on slopes and coastal plains and strands, often in extensive groves, sometimes planted. It grows on Massif de la Hotte, Haiti, according to Barker and Dardeau Flore d'Haiti (1930),

FIG. 175. LEAF OF HAT PALM, Guanajibo, Puerto Rico. *Sabal causiarum*. Note the filaments or threads hanging across the blade; also the ribbons or shreds at base of petiole; and the large palman.

known as *Latanier chapeau*; Burret considers Haitian occurrences to be introductions (Palmæ Cubenses et Domingenses a Cl. E. L. Ekman 1914-1928 lectæ. 1929). Hats are made from material prepared from the leaves as well as mats, baskets and other articles. Type from Joyua, Puerto Rico.

Note discussion of 7, *S. umbraculifera* on page 312.

FIG. 176. JAMAICA PALMETTO. *Sabal jamaicensis*. Trees in the distance have been cropped. Port Royal mountains, Jamaica.

11. **Sabal guatemalensis,** Becc. in Webbia, ii, 68 (1907).

Inflorescence (spadix) robust, the branches to 80 cm. long; rachillæ to 12 cm. long and angled and very slender: flower-bud oblong and rounded at end, 4 mm. or more long; calyx fleshy, only inconspicuously if at all costulate; corolla twice longer than calyx, conspicuously costulate; filaments subulate: foliage and fruit undescribed.

Guatemala.

12. **Sabal jamaicensis,** Becc. in Fedde, Repert. vi, 94 (1909). JAMAICA PALMETTO. BULL THATCH. Figs. 156, 160, 170, 176.

Stout heavy tree with columnar trunk to 13 m. or more that becomes smooth and gray with age, bearing a more or less globular top with a few hanging dead or aging leaves and an open look due to the long petioles and many often declined leaves: petiole 1 m. and much more long, obtusely convex on under surface, shallowly concave and somewhat ridged on upper face except toward base where the thin margins upturn prominently; hastula (Fig. 156) long narrow and acute, to 24 cm. in length, the thin margins upturned and sometimes somewhat inrolled; costa strong and extending length of blade; leaf-blade prominently decurved, not glaucous although perhaps so appearing, only moderately filiferous or some leaves

FIG. 177. HEAD OF CARAT in the wild at Mayaro, Trinidad. *Sabal mauritiæformis*. Note the very open crown, long inflorescence at upper left, and slender trunk from which a liana depends.

bare, 1 m. and more across, palman to 36 cm. or more; segments 40 and more on either side, very firm, ½ m. and more long, main central ones to 6 cm. broad toward base, long-pointed and variously bifid, prominently but finely many-nerved lengthwise either side the very strong midnerve: inflorescence mostly not exceeding the foliage, much branched from ample acuminate sheaths; ultimate rachillæ 3-8 cm. long, closely flowered and glabrous and terete: flowers about 5 mm. long, sessile although appearing somewhat pedicillate when dried and shrunken, petals ascending and nearly acute and not quite equalling the conspicuous anthers, as in Fig. 170: fruit depressed-globular, 12-13 mm. broad and 9-11 mm. high, very dark dull brown; seed decidedly depressed, about 10 mm. across and 6 mm. high, micropyle lateral.

Jamaica, on mountain ridges, slopes, coastal bluffs and intermediate areas, often making extensive groves and again as scattered trees in woods. Type station, Pedro Bluff, Jamaica, Harris no. 9736.

This Jamaican palm has been supposed to be the same as the Cuban *S. parviflora* but the presumption is against it, considering the very different floras of the two islands and the fact that the other palms are not conspecific. The very open head with many declined petioles of *S. jamaicensis* appears to be different from the prevailing forms of *S. parviflora*, leaves less filiferous, the central leaf-segments are much wider and bear more prominent secondary nerves, flowers somewhat larger, and the fruits are broader by 2 mm. or more and asymmetric.

Beccari states a few small technical differences between the two species but it is very difficult to verify them. He founded *S. jamaicensis* on Harris 9736 seen in Berlin. The writer has examined this number in the herbarium of Hope Gardens, Kingston, Jamaica, and in the National Herbarium, Washington. In those specimens the long slender-filiform apices of the segments, which Beccari stresses, are apparent, but on other areas of blades one may find the broader less caudate segments-tips assigned to *S. parviflora* (Fig. 162).

13. **Sabal mauritiæformis,** Grisebach & Wendl. (*mauritiiformis*), Flora of the British W. Indian Isls., 514 (1864). CARAT. Fig. 177.
Trithrinax mauritiæformis, Karsten, Linnaea, xxviii, 244 (1856); Fl. Columb. ii, 137, t. 172 (1869?). (This binomial was in use as a *nomen nudum* before formal publication by Karsten: Wendland, 1854, Index Palmarum, Cyclanthearum, Pandanearum, Cycadearum, 41 "T. mauritiæformis, Hort. Venezuela. H. Decker").
Corypha glaucescens, Lodd. Cat. ex Martius, Hist. Nat. Palm. iii, 247 (1838), nomen.
Sabal glaucescens, Auth. and Hort.

Graceful rather slender tall palm with bare trunk attaining 20 m. and more, 4 dm. or more thick, obscurely ringed, with a globular-oblong head that has an open disheveled look due to the long petioles, flaccid

foliage, drooping lower leaves, and very deeply cut blades, the midrib decurved: petiole to 2 m. and more long, slender, roundly convex on under surface, flatly concave on upper face to deeply trough-like toward lower end, 1.5-3 or 4 cm. thick under hastula, with attached fibres at base, erect or ascending in upper part of head, curved or declined in lower part; hastula small and short, about 3-8 cm. long and the edges mostly strongly inrolled; costa very slender but continuing nearly length of blade; leaf-blade medium to large, sometimes 3 m. across, strongly many-ribbed, prominently glaucous underneath but green on upper surface, roughly

FIG. 178. LEAF IN POSITION AND TWO TRUNKS of Jata palmetto. *Sabal Yapa*. Note the deep laciniation of the leaf, the palman nearly obsolete. Batabanó, Cuba.

semi-orbicular in outline but ambitus obscured by the few very deep divisions which extend nearly or quite to the hastula or lower part of midrib so that the undivided palman is very small, filaments none or few; segments many, of four or more groups, each group extending to base of leaf and again divided, the lower side segmental divisions being 3 cm. broad and tapering into long narrow bifid ends, the middle divisions 15 cm. or more broad before they separate into short pointed ends and the midnerves very prominent: inflorescence ascending and horizontal, conspicuously exceeding the leaves, paniculately much branched; sheaths or spathes long-tubular with acuminate points; ultimate rachillæ 4-5 cm. long and closely flowered: flowers sessile, whitish, fragrant, long petals much exceeding calyx and about equalling the anthers at anthesis: fruit slightly depressed-globose, 8-11 mm. or more across, sometimes double or triple from development of carpels; seed depressed, 8 mm. across and 6-7 mm. high, dark brown, micropyle small.

Attractive palm in Trinidad, warm parts of Venezuela and Colombia, readily recognized in the field by the glaucous under surface of leaves, the few broad central divisions of the leaf and the side segments in different planes. From recent studies, Burret is of the opinion that it extends to British Honduras and is inclined to assume that it occurs in the wild in regions of Central America that lie between British Honduras and Colombia (Fedde, Repert. xxxii, 101, 1933). Type region, Colombia.

Karsten's picture of a large tree is not at all characteristic of the foliage of the palm we know as *S. mauritiæformis*, although the three-year-old

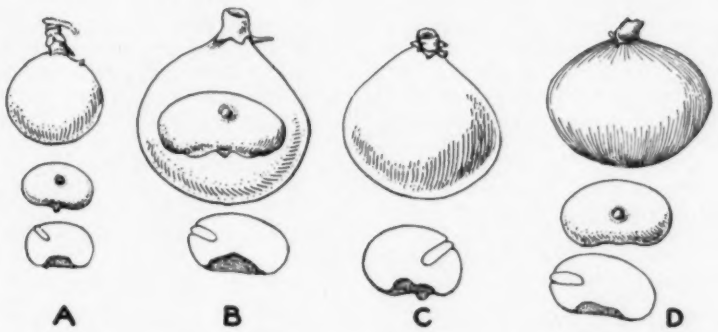

FIG. 179. FRUITS AND SEEDS of four palmettoes (×1½). A, *Sabal Yapa*. B, *Sabal exul*, showing persistent style (placing of seed is an engraving necessity and is not intended to show its exact position in the fruit). C, *Sabal bermudana*. D, *Sabal texana*.

plant in the foreground is recognizable. Leaves of young plants have somewhat the look of foliage of Licuala. Field observation and competent specimens are required for the understanding of this palm. Plants seen in tropical botanic gardens as *S. mauritiæformis* have proved to be of the *S. umbraculifera* kind, although the two species are very unlike.

Doubts about the interpretation of *Sabal mauritiæformis* are complicated by the fact that seeds of another palm, apparently yet undescribed, have been in the market under this name. This other palm appears also to pass sometimes as *S. Ghiesebrechti*, which is a confused name discussed on page 336. What appears to be the same palm comes from an Asian botanic garden as *S. glaucescens*.

14. **Sabal Yapa,** Wright ex Becc. in Webbia, ii, 64 (1907). JATA PALMETTO. CANA JATA. Figs. 170, 178, 179.

Inodes japa, Standley, in Contrib. U. S. Nat. Herb. xxiii, pt. i, 71 (1920).

Tree to 6 or 10 m. and more, trunk bare or covered with petiole-bases; top or head loose and open, with a tousled or disheveled appearance (by which it is quickly distinguished at a distance) due to the deep division of the leaf-blades with long segments separated to base of blade spreading and hanging loosely in many planes, the leaves themselves standing in all directions: petiole 1 m. or more on large leaves, boldly convex on lower face, broadly concave on upper face unless toward the top and bearing an obscure central ridge; hastula 6-8 cm. long, mostly narrow and long-pointed, trough-shaped because of the upturned edges; costa extending well through the blade but most of the segments independent of it; palman practically none; filaments lacking; segments 30 and more on either side, extending nearly or quite to the hastula or lower part of costa and leaf not presenting the long curve so usual in palmettoes, most of them twice-divided,—for example the basal part 20 cm. long with 3 strong costæ (and thinner parallel veins), then two parts 40-50 cm. long usually with only 1 strong costa, the end of each being split one-fourth to one-half the length into 2 unequal long-pointed parts: inflorescence profuse and much branched, extending beyond the foliage; rachillæ glabrous and more or less angled: flowers sessile, about 5 mm. long, petals divergent in anthesis as in Fig. 170, stamens and pistil very prominent: fruit globular, 9-11 mm. thick, frequently two developing from one flower, not sensibly narrowed but the base sometimes somewhat oblique when only one carpel matures, pedicel sometimes adhering; seed depressed, about 7 mm. across and 5 mm. high.

Western Cuba in open savannas and in woods, in the former situation mostly a lower tree and by natives often said to be distinct: Havana and Pinar del Rio provinces. Yucatan: *Gaumer;* Merida, *Schott.*

The binomial *Sabal Yapa* remained unpublished for forty years after Charles Wright applied it to herbarium specimens (no. 3971) he had collected in Cuba some time in the 1860's. Specimens were distributed by Asa Gray. In the Gray Herbarium are three sheets of it, representing only flowers (inflorescence) and fruits, with the label "Sabal? Japa Wr." In the National Herbarium it is ticketed "Sabal? Japa sp. nov." A specimen of this number has been seen by the writer at the Academy of Sciences, Havana, and photograph has been supplied by Brother León. Sauvalle listed it in 1871 in Anal. Acad. Ci. Habana, vii, 562 as "Sabal? Japa Sp. nov.? 3971. Guano cana de monte, Chagareta." In 1893 Gomez de la Maza lists it, again without publication, in Nociones de botanica sistematica. It remained for Beccari in 1907 to publish the name and to draw diagnosis from Wright's specimen in Berlin. He made the name Yapa, which, being the first tenable publication, must stand; in any case, Japa and Yapa would be pronounced alike as a specific name.

15. **Sabal exul,** Bailey, in Rhodora, xviii, 155 (1916). VICTORIA PALMETTO. Figs. 179, 180.

Inodes exul, Cook, in Circ. no. 113, Bur. Plant Ind., U. S. Dept. Agr. 14 (1913).

Hardy robust stately tree to 10 m. and more, head rather open due to the long petioles standing in all directions and foliage firm, large trunk 15 dm. thick, at first covered with criss-cross petiole-bases but coming bare with maturity, rough-ringed, the large rather open head showing many long very narrow attenuate leaf-segments: petiole 1.5 to nearly 2 m. long, very broad and widely split (bootjack) at base on old trees and bearing prominent brown fiber, roundly convex on lower surface, shallowly concave on upper face in lower part to nearly flat and centrally ridged in top

FIG. 180. HEAD OF VICTORIA PALMETTO, one of the older trees at Victoria, southern Texas.—*Sabal exul.*

FIG. 181. STAND OF NATIVE BERMUDA PALMETTO in Paget marsh, near Hamilton, Bermuda.—*Sabal bermudana*.

part, 9 or 10 cm. broad just above enlarged base and 3-4 cm. at the top; hastula very long, 15-20 cm., long-pointed, thin margins somewhat upturned; costa very strong and continuing; leaf-blade usually more than 1 m. long and broad, decurved, bright green, moderately long-filiferous but variable in this respect between different leaves, palman occupying perhaps one-fourth the length; segments many with more or less drooping tips on the laterals, nearly or quite 1 m. long, the central ones 5 cm. broad at base, ends of centrals broad but of laterals long caudate-pointed: inflorescence about equalling the leaves, nodes relatively short and loose sheaths with broad short-pointed tips; rachillæ 3-5 cm., long, somewhat angled or ridged, not striate, rather loosely flowered, glabrous: flowers 5 mm. long, sessile, subtending bracts not long-pointed, calyx and corolla strongly nerved, narrow petals divaricate in anthesis and twice longer than calyx and about equalling short anthers: fruit depressed-globose with short-tapering base, variable size but normally about 18-20 mm. across (sometimes 21 mm.) and usually as high, smooth and shining brown at maturity, provided with a thin mesocarp that dries and leaves the seed more or less loose in a hard shell; seed depressed, about 10-12 mm. across and 7 or 8 mm. high, scarcely hollowed at base, dark glossy brown with conspicuous elevated latera micropyle.

FIG. 182. TREE of *Sabal Blackburnia*. From Glazebrook. Page 330.

Described from trees cultivated at Victoria, Victoria County, southern Texas, supposed to have been introduced from Mexico although not botanically recognized in that country. "The type individual of the new species graces the lawn of Mrs. Martin O'Connor, of Victoria, Tex."—*Cook*.

The fruit in *Sabal exul* appears to be inconstant in size and shape, and sometimes it resembles that of *S. texana*, raising question as to identities. Cook, who first recognized *exul*, speaks of the fruit as having "a somewhat oblique narrowed base bearing the conical persistent style as a spinelike

basal projection nearly 2 millimeters in length. Only one fruit is developed from a flower. There are none of the twin and triplet flowers that are of frequent occurrence in *Inodes texana*."

† 16. **Sabal bermudana,** nom. nov. BERMUDA PALMETTO. Figs. 179, 181, 184.

S. Blackburniana, Hemsl. in Rept. Voy. Challenger, Bot. i, 70 (1888), not Glazebrook; the form of the name accepted by subsequent authors.

Stout palm with erect or inclined obscurely ringed trunk to 12 or 13 m. tall and 1 m. or more circumference and that eventually becomes nude, not always straight, bearing an irregular open head characterized by long erect, spreading and deflexed petioles and in protected natural places by hanging old leaves, the foliage bright green: petiole 1 m. and more long, equalling or exceeding the blade, rather slender, convex on under surface, concave on upper surface with narrow upturned margins and ridged in the center, base bearing prominent coarse fibers; hastula narrow and pointed, to 10 or 12 cm. long, thin margins upstanding; costa stout, marked by a central ridge, extending through the leaf and giving it a decurved shape; leaf-blade 2-3 m. across, palman 30 cm. or more long and prominently mid-ridged, constituting about one-third of the blade, the ridges scurfy at least when young, filaments few or none; segments 30 and more on either side, 60 cm. or more long, 4-5 cm. broad at base, bifid into long tapering but not caudate-filiform ends, midnerve

FIG. 183. SHORT FLOWER-CLUSTERS of *Sabal Blackburnia*. From Glazebrook. Page 330.

very prominent, secondary nerves many and fine: inflorescence 1-2 m. long, much branched, usually not exceeding the leaves and often shorter, the loose sheaths or spathelets with conspicuous points; rachillæ to 10 cm. long, striate, obscurely angled to nearly or quite terete, glabrous, thickly flowered: flowers white, about 4 mm. long in anthesis, sessile, one of the subtending bracts long and pointed, calyx strongly costate, petals oblong and somewhat pointed, not costate on back, about equalling the very short and broad anthers: fruit sometimes twin (2 carpels), short-pyriform or globose with a contracted base, 15-18 or 20 mm. broad and of

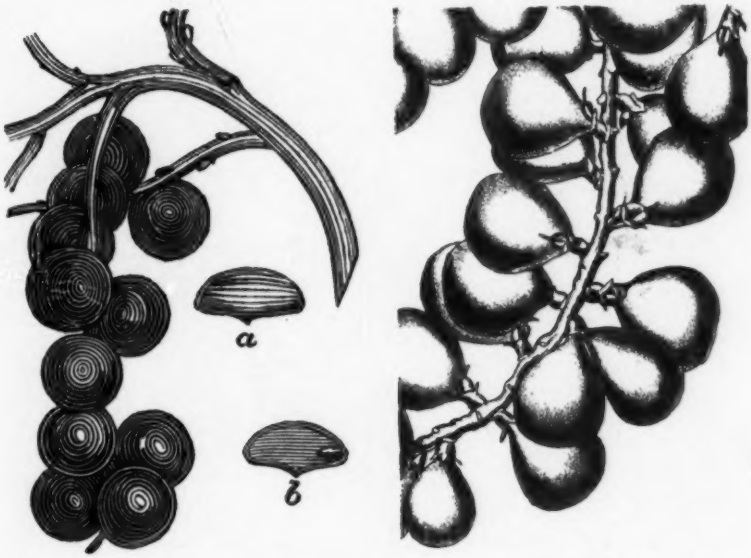

FIG. 184. FRUITS of *Sabal Blackburnia* left (× about 3/5), from Glazebrook, and fragment of *S. bermudana* right (× nearly 1), from Hemsley.

similar height, smooth, black at maturity; seed depressed-globose when freed from the inner integument, 10-14 mm. broad and 7 or 8 to 10 mm. high, dark shining brown, micropyle small and usually above the middle.

Indigenous in Bermuda, apparently endemic; lowlands and uplands, assuming several forms; a noted native stand is in Paget marsh near Hamilton (Fig. 181). Supposed to be extensively in cultivation, but this is questionable: see *S. Blackburnia*, page 330.

Until relatively recent time this species was not considered to be peculiar to Bermuda. In 1891 it was definitely stated to be endemic by Garden and Forest (iv, 302), edited by Sargent, and this opinion maintains until the present. Until Hemsley reported in 1885 on the botany of the Challenger Voyage the Bermuda palm was known under various names

and attributed to other regions. For example, Lefroy, 1884, calls it *Sabal Palmetto*, Lodd. with the remark, "Native and universal; originally American, not West Indian" (The Botany of Bermuda, 113). The following year Reade names it *S. umbraculifera*, and adds "distribution, Bahamas, where it appears to grow much higher" (Plants of the Bermudas, 81). Hemsley does not make a positive statement: "Bermudas.—Indigenous and endemic?" and adds the following statement: "Until Sir Joseph Hooker took the palms in hand to elaborate them for the Genera Plantarum,

FIG. 185. NATURAL GROVE of Rio Grande palmetto in the lower Rio Grande Valley. *Sabal texana*. Page 334.

it seems to have been generally supposed that *Sabal palmetto* inhabited the Bermudas as well as south-eastern North America; but among the imperfect material in British herbaria from the islands there was nothing belonging to that species; and what there was, though insufficient for identification, indicated a different species. The descriptions, too, in the earlier writers of the fruit of the Bermudan palm proved that the common one could not be *Sabal palmetto*, for the fruits were much larger."

17. **Sabal princeps,** Becc. in Webbia, ii, 59 (1907).

Cultivated palm closely allied to *S. bermudana* but with noticeably smaller fruit and seed and flowers. It is described as a large species with thick trunk covered persistently with the bases of old petioles which are connected by thick rough fibers: leaves very large, the blade 1.5 m. and

more long; hastula lanceolate-acuminate with involute margins; costa or rachis very stout, prolonged to about one-half the length of the limb and distinctly wing-marginate; petiole stout, equalling or somewhat exceeding the blade in length, 3.5 cm. broad at apex, 18 mm. thick on the median part, strongly convex underneath and lightly concave above and bearing a central ridge; segments about 100, almost chartaceous, green on both surfaces, briefly cleft at apex, with 8-10 secondary nerves, many small oblique transverse nerves, larger ones 4.5-6 cm. wide; palman occupying about one-half the blade: inflorescence pendent in fruit, about 2 m. long; rachillæ angled and not very densely flowered, erect-spreading and rigid: flowers much like those of *S. bermudana*, calyx and corolla distinctly costulate: fruit globose-obpyriform, distinctly attenuate to base, 13-16 mm. in diameter and 15-17 mm. high; seed depressed-globose, 8-10 mm. broad and 6 mm. high, concave at base, light brown in color.

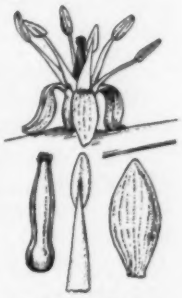

FIG. 186. FLOWER AND PARTS of *Sabal Rosei*. Flower (×3). Pistil, stamen, petal (×5). Page 335.

Nativity unknown. Beccari based his account on a tree growing in the botanical garden at Palermo, the specimen having been brought in 1870 from the Linden establishment in Belgium. He remarks that a characteristic of the Palermo tree is a clear yellow zone on the leaf along either side the costa. The micropyle on the seed of *S. princeps* is roundish and not pungent, and the embryo is at the middle of one side.

Beccari attributes this species to "Hort.," but there is no indication that it is *S. princeps*, Hort., of earlier writers. As a *nomen nudum* of long standing, *Sabal princeps* Hort. Versch. is listed by Wendland in Kerchove Les Palmiers in 1878, page 256. The name is listed without description in the Kew Report for 1882, 63. Again *S. princeps* Hort. Petr. is entered by Rudolf Pfister in 1892, without description, in Beitrag zur vergleichenden Antomie der Sabaleenblätter, 42. In reference to pollination, Paul Erich O. W. Knuth describes *Sabal princeps* Hort., and figures a flower in 1904: Handbuch der Blutenbiologie, iii, 65, fig. 7, 6. These notations mean that *Sabal princeps* is an old garden name, but it apparently waited for diagnosis by Beccari in 1907. In the Beccari account are inharmonies in size of fruit and seed between the text and the key; outside dimensions are given in the present treatment. Seeds under this name may still be had in the market. More than one species is grown under the name. Specimens of *S. princeps* from the botanic gardens in Singapore are *S. minor*. Juvenile specimens taken in Jardim Botanico by Rio de Janeiro belong to subgenus Inodes. Apparently a third kind is planted in Galveston, Texas, as *S. princeps*.

Probably *Sabal princeps* is in cultivation in many places. Perhaps this account may call attention to it. The author has collected what may be the Beccarian *S. princeps* in the Botanic Garden at Port-of-Spain, Trinidad,

without name; and he has what appears to be the same palm from farther Asia under the name *S. mexicana*.

18. **Sabal Blackburnia,** Glazebrook, in Loudon's Gardener's Magazine, v. 52 (1829).

Inodes Blackburniana. Cook, in Bull. Torr. Bot. Club, xxviii, 531 (1901), as to name.

Stout arboreal palm with columnar trunk marked eventually by ringed scars: leaves costapalmate, very large, the petiole to 2 m. and more, blade 2 m. long and 3 m. broad: inflorescence shorter than petioles, much branched, about 1 m. long and somewhat more across: flowers sessile, white, petals divaricate at anthesis, the short orange arrowhead anthers conspicuous: fruit large, globular, not tapering, about 20 mm. across, making hanging clusters like bunches of grapes.

Nativity unknown, and not recognized in recent time.

In 1826 (and perhaps earlier) a *Sabal Blackburniana* was listed in the Catalogue of Plants in the collection of Conrad Loddiges and Sons, English nurserymen, without description or nativity, and also in Sweet's Hortus Britannicus as having been introduced from South America in 1824, again without description. The binomial is a *nomen nudum*, and cannot be accepted.

In 1828 T. K. Glazebrook prepared an account of a striking palm at Hale, seat of John Blackburne, M. P., that bloomed in 1818 and "continued to produce flowers and fruit almost continuously up to the present moment"; the article found publication in the Gardener's Magazine under date 1829. There is no evidence that Glazebrook intended to describe a new species, but only to give an account with pictures of an interesting glasshouse subject; he says nothing about the nativity of the plant. In the title of the article the name of the palm appears as *Sabal Blackburnia*, as also in the overheads as well as in table of contents and index. At the close of the article Glazebrook writes: "This palm has been successively named, by those who have seen it, 'Corypha umbraculifera, Corypha umbraculifera minor, Corpha minor, and Sabal Blackburniana'. The latter, I am led to understand, is its present appellation, as well as being considered the most correct. Of this I will not presume to decide." The form *Blackburniana* cannot be taken up, under present rules, unless tenable publication can be discovered in advance of Glazebrook.

Exact measurement of the fruit is not given by Glazebrook: "The berry is globular, about two inches and three-eighths in circumference, filled with albumen, finally becoming hard, or horny. The embryo very small." This would make the fruit about ¾ inch across, which places this palmetto among the large-fruited kinds.

Striking feature of this palm in the two pictures from Glazebrook (Figs. 182, 183) is the very short inflorescence, not even equalling the petioles.

This peculiarity is reinforced by statements in the Glazebrook text that the spathe forms a panicle 3 feet high and 4 feet across whereas the petiole is given as 8 feet long.

Martius referred *Sabal Blackburniana* to *S. umbraculifera*, and it has had other interpretations. In general, the name was unplaced until 1885 when W. B. Hemsley applied it to the Bermuda palmetto in Report of the Scientific Results of the Voyage of H M S Challenger, Botany i, 70-73, with four excellent plates. Fruit of *Blackburnia*, as described and figured by Glazebrook, is not at all the same as that of the Bermuda palmetto in shape, and there are other discrepancies; and we have noted that there is no indication in the record that the Blackburne plant was Bermudan. For these reasons there appears to be no alternative but to give the Bermuda palm a new name, *Sabal bermudana* (no. 16).

Pictures from the Glazebrook account will help us to understand. Figs. 182, 183, "by no means satisfactory, as it is impos-

FIG. 187. CHARACTERISTIC TREES of Tepic palmetto, with slender trunk and peculiar head. *Sabal Rosei*. Southern Sinaloa, Mexico. Page 335.

sible, on so small a scale, to do it justice," show the very short inflorescences which is a peculiarity of this plant and which is specially mentioned in the text. Fig. 184 is the fruit, somewhat enlarged from the Glazebrook article but still not full size; with this is to be contrasted a few fruits of the Bermuda palmetto engraved from one of the Hemsley plates; Fig. 182 is also to be compared.

Probably *Sabal Blackburnia* is still in cultivation. It is hoped the present account may be the means of rediscovering it both in gardens and in the wild.

Specimens from trees grown as *S. Blackburniana* in the Straits Settlements are of the *S. Deeringiana* kind, from Rio de Janeiro are *S. Palmetto*, from southern Florida being pieces of leaves only are undeterminable.

19. **Sabal uresana,** Trelease, in Rept. Mo. Bot. Gard. xii, 79, t. 35-37 (Apr. 1901). SONORA PALMETTO. PALMA BLANCA. Figs. 188, 190.

Inodes uresana, Cook, in Bull. Torr. Bot. Club, xxviii, 534 (Oct. 1901).

Stout erect tree with open top due to very long petioles, and conspicuously blue-glaucous foliage; trunk to 10 m. tall, obscurely ringed after the casting of leaf-bases: petiole mostly longer than the blade, to 2-3 m., strongly convex on under surface, concave on upper face and obscurely centrally ridged in upper part, base 5-6 cm. broad and bearing shreds or fibers, 2-4 cm. broad at apex; hastula 10-14 cm. long, pointed, margins either spreading or up-rolled; costa stout, extending through the blade which is strongly decurved; leaf-blade somewhat waxy in feel, often 2 m. and more across and of similar length, abundantly filiferous, palman about one-half its length; central segments 4 cm. broad at base and lateral ones half as broad, stiff and thick, midnerve pronounced and secondary veins many and fine, tips long bifid and produced into slender caudate tips: inflorescence much branched, sheaths with sharp points; rachillæ 8 cm. long, stout, densely flowered, terete, glabrous: flowers 4 mm. long, sessile, petals narrow and erect or ascending and thrice longer than calyx, short anthers prominent: fruit depressed-globose, about 20 cm. across at maturity and two-thirds as high, smooth and glossy, light brown; seed depressed, 12-14 mm. across and 7 or 8 mm. high, dark glossy brown, contained in a fleshy mesocarp becoming dry, said to be edible, microyple lateral and prominent.

Northwestern Mexico, on open tablelands and in canyons, in state of Sonora, a striking tree because of its distinct glaucous foliage. First recognized by William Trelease in 1900 near Ures, Sonora, where it formed a scattering forest, "with most beautifully glaucous foliage." The writer has seen and collected it farther southwestward in canyons and glades near the sea; note also collections in the same region by Ivan M. Johnston reported in Proceedings of the California Academy of Sciences, 1924. Its general distribution is unknown.

FIG. 188. YOUNG TREE of Sonora palmetto. *Sabal uresana*. Singed trunks of *Washingtonia sonoræ* in background. Nacapule Canyon, near Guaymas, Sonora, Mexico.

FIG. 189. GUANAJUATO PALMETTO, *Sabal Dugesii*, from pencil sketch by Dr. Dugès.

20. **Sabal texana,** Becc. in Webbia, ii, 78 (1907). Rio Grande Palmetto. Palma de Micharo. Figs. 179, 185.

Inodes texana, Cook, in Bull. Torr. Bot. Club, xxviii, 534 (1901).

Sabal mexicana, S. Wats. in Proc. Amer. Acad. Arts & Sci. xxv, 136 (1890); Sarg. Silva, x, 43 (1896); not Martius.

Ponderous palm, trunk attaining to 16 m. high and 8 dm. in diameter, brown or reddish, self-cleaning with age but sometimes retaining petiole-bases till nearly full growth, roughly ringed; head or top rather dense, green, dead hanging leaves frequently making a shag somewhat like Washingtonia: petiole equalling or exceeding the blade, 1 m. and more, convex on under surface, concave with more or less upstanding margins on

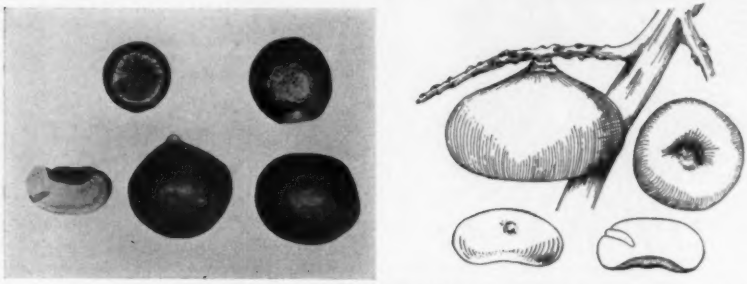

Fig. 190. Fruits and seeds of two Mexican palmettoes, natural size; left, *Sabal uresana;* right, *S. Dugesii.*

upper face and centrally ridged toward top; hastula 10-12 cm. long, long-pointed, margins plane or somewhat rolled; costa strong, extending length of blade, more or less margined; leaf-blade more than 1 m. long and broad, moderately filiferous, palman one-fourth more or less the total length; segments 1 m. in length, central ones 4-5 cm. broad at base, lateral narrower, deeply bifid into long narrow caudate points: inflorescence mostly shorter than leaves, sheaths pointed; rachillæ slender, 5-10 cm. long, somewhat ridged or lined, rather loosely but evenly flowered, glabrous: flowers fragrant, sessile, sharp-bracted, 5 cm. long, very narrow and divaricate in bud, calyx and petals strongly parallel-nerved, petals narrow and wide-spreading in anthesis, much exceeding calyx and about equalling the short anthers: fruit (sometimes twin or lobed) 15-17 mm. diameter and a little less high not counting the stipe-like base, slightly depressed-globose with somewhat attenuate bottom, black and with thin brittle shell when mature, containing a sweet soft mesocarp; seed depressed, 11-13 mm. across and 7-8 mm. high, glossy very dark brown, micropyle centrally lateral and prominent.

Lower Rio Grande Valley, northeastern Mexico, and Texas in Hidalgo and Cameron counties; near Brownsville, Texas, abundant in groves and the land sometimes cultivated between the trees; Type locality, near Matamoras, Tamaulipas, Mexico (Berlandier 877).

An entertaining account of *Sabal texana*, with three plates, may be found in vol. xxviii of the Journal of the New York Botanical Garden, pages 132-143, 1927, by John K. Small.

21. **Sabal Rosei,** Becc. in Webbia, ii, 83 (1907). TEPIC PALMETTO. Figs. 186, 187, pages 329, 331.

Inodes Rosei, Cook, in Bull. Torr. Bot. Club, xxviii, 534 (1901).

Sabal uresana var. *roseana*, Johnston, in Proc. Calif. Acad. Sci. xii, 995 (1924).

Slender palm with small open globose head and markedly decurved leaves, and a self-cleaning trunk 7-12 m. tall ("trees 6-12 or sometimes even 18 m. high," *Rose*) that bears many leaf-scars, 6-8 dm. in girth, the base not bulged: petiole 1 m. long, slender, 3-4 cm. broad toward base and about 2 cm. at apex, convex on under surface, nearly flat but with narrow ascending margins on upper face and somewhat ridged in center; hastula small and narrow, 5-8 cm. long with inrolled margins; costa strong and continuous; leaf-blade green throughout, conspicuously filiferous, about 1 m. either way, cut nearly to base so that the palman is very short; segments 30 and more on either side, very narrow, deeply bifid at apex into long slender caudate points, main ones about 2 cm. broad at middle, with conspicuous rib which may bear brownish loose scales underneath, and many very close fine secondary veins: inflorescence 2 m. long, much branched, about equalling leaves or projecting somewhat in fruit, main sheaths bearing long narrow-acuminate points: flowers light stramineous, faintly fragrant, sessile, about 6 mm. long, petals reflexed in anthesis and stamens prominent (as in Fig. 186): fruit spherical, 18 mm. diameter, blackish or bluish at maturity.

Common palm, leaves employed for thatch, in southwestern Sinaloa and northwestern Tepic (Nyarit), western Mexico, on dry levels and in hilly country. The range of distribution is not determined. The writer has taken it in the tropics south of Mazatlan, also north of the line far east of Culiacan in the hill country, and has seen apparently the same palm as far north as Retes and Palos Blancos. It was first collected by the late J. N. Rose. Type station, Acaponeta, Nyarit, western Mexico.

† 22. **Sabal Dugesii,** S. Watson in herb., spec. nov. GUANAJUATO PALMETTO. Figs. 189, 190.

Arbor trunco columnari rectoque 10 m. alta, como compacto: petioli breves validique, folia decurvata: inflorescentia brevis, denique pendens: fructus depressus, fastigatior ad basim, 27 mm. latus et fere 17 mm. altus, nitido-fulvus, crasso mesocarpio; semen depressum, 16 mm. latum, 8 mm. altum, ad basim cavum, nitide atrofulvum.

Stout tree to 10 m. high, trunk becoming bare; head rather close, the petioles short, leaf-blades decurved: inflorescence short, pendent in fruit, sheaths with points; rachillæ 6-10 cm. long, stout, nearly or quite terete, glabrous, thickly flowered: fruit largest in the genus, conspicuously depressed, 27 mm. across and about 17 mm. high, somewhat tapering to base.

dark brown and glossy, containing a thick mesocarp that becomes spongy when dry; seed flattened, hollowed at base, 16 mm. broad and about one-half as thick, glossy, very dark brown, micropyle super-lateral, small for size of body.

Guanajuato, central-southern Mexico, long ago sent to the Gray Herbarium where Sereno Watson, who died in 1892, gave it a name in honor of the collector, the distinguished Alfredo Dugès. Native of Montpellier, Dr. Dugès was French Consular Agent at Guanajuato, where he died in 1910 at the age of eighty-three years. He was professor of natural history at Colegio de Guanajuato, member of scientific societies, contributor to "La Naturaleza," and discoverer of many new species of plants and animals.

NON-VALID AND UNPLACED NAMES

(not mentioned in text)

Nomina nuda et incerta

Sabal

Adansoni var. *major*, Wendl. Index Palm., 35 (1854): nomen. Mexico?

australis, Hort. Petr. ex Pfister, Sabaleenblätter, 42 (1892): nomen.

Carat. "*S. Carat* and *S. Mucini* were planted at Mount Langton with promise of permanence," Lefroy ,The Botany of Bermuda, 113 (1884). *S. mauritiæformis*?

carolinianum, Hort. ex Poir. Encyc. vi, 356 (1804): nomen. Presumably *S. minor*.

cærulescens, Hort. Bull. adv. in Gard. Chron. ser. ii, iii, 589 (1875). Leaves plicate, glaucous underneath. Colombia. *S. mauritiæformis*?

columnaris, Hort. ex Martius, Hist. Nat. Palm. iii, 320, 348 (1850): nomen. Cuba.

dealbata, Linden, in Ill. Hort. xxviii, 32 (1881): nomen. Tabasco (Mexico).

Denisoni, Hort. Kew ex Pfister Sabaleenblätter, 41 (1892): nomen.

elata, Hort. ex Martius, Hist. Nat. Palm. iii, 320, 348 (1850): nomen. Cuba.

extonianum, Hort. ex Gentil. Plant Cult. Serr. Gard. Bot. Brux., 170 (1907): nomen.

floribunda, Katzenstein catalogue, 1934. Texas.

Ghiesebrechti, Hort. Petr. ex R. Pfister, in Beitrag. z. vergl. Anatomie d. Sabeleenblätter, 41 (1892); brief anatomical description, not sufficient to constitute phytographic publication. Beccari, spelling the name *Giesbreghtii*, states that a tree so named in Palermo botanic gardens is *S. Palmetto*. A barren tree in a private California estate, labelled *Ghiesbrechtii*, is apparently *S. Palmetto;* in the botanic garden at Gavea, Rio de Janeiro, one so named is a striking palm with characteristics quite unknown to the writer (see discussion on page 321).

gigantea, Fulchir. ex Steud. Nomen., ed. ii, ii, 489 (1841): nomen.

graminifolia, Lodd. ex Martius, Hist. Nat. Palm. iii, 247 (1850): nomen. Antilles.

Histrix, Pursh ex Nutt. in Amer. Journ. Sci., ser. i, v, 293 (1822): *Rhapidophyllum Hystrix*.

longifolia, Hort. Petr. ex Pfister, Sabaleenblätter, 42 (1892): nomen.

macrophylla, Hort. Petr. ex Pfister l.c.: nomen.

Magdalenæ, Linden, in Ill. Hort. xxviii, 32 (1881): nomen. Colombia.

maritima, Burret, in Fedde, Repert. xxxii, 101 (1933). *Corypha maritima*, HBK. Gen. Nov. et Spec. i, 298 (1815).

The account of *Corypha* maritima in HBK is not sufficient to identify the species intended. Flowers and fruits were not known. In an unpublished manuscript on the Cuban palms, made many years ago, the late N. L. Britton transferred the name *maritima* to Sabal and made it replace *Sabal parviflora*, Becc. In Webbia, 1907, and again in the Palms of Cuba, 1912, Becarri questions whether *maritima* may not be *S. Yapa*, and this is the more probable disposition. Or there may be a third species at Batabanó, the accredited station. It must remain a *nomen incertum*.

Mocini, Wendl. Index Palm., 35 (1854): nomen.

oleracea, Hort. ex Martius, Hist. Nat. Palm. iii, 320, 348 (1850): nomen. Mexico.

picta, Wendl. Index Palm., 35 (1854): nomen.

Pumos, Burret, in Fedde, Repert, xxxii, 101 (1933). *Corypha Pumos*, HBK. Nov. Gen. et Spec. i, 298 (1815).
The HBK account calls for a tree 6 to 12 feet high ("caudex bi-aut quadriorgyalis"), with leaves 5 feet long, filiferous, segments lanceolate and bifid; spadices 3-4 feet and more, branched, pendulous, solitary; flowers unknown; fruit a spherical drupe ½ inch in diameter, short-pedicelled, fibrous and succulent, black at maturity; seed globose-depressed. The palm was found by the volcano Jorullo and on plateau of Agua Sarco (presumably in Michoacan), Mexico. Beccari in Webbia, 1907, questions whether it may not be the plant later described as *Sabal Rosei;* but the fruit of *Rosei* is too large for *Pumos* and it is not spherical. The description of *Corypha Pumos* places it in the class of small-fruited tree palmettoes. The late Dr. Dugès sent a palmetto to Sereno Watson with the query whether it might not be *Corypha Pumos;* but the fruits were twice larger than those of *Pumos* and quite contrary to spherical; his plant appears in this monograph as *Sabal Dugesii*. no. 22. We are to expect *Sabal Pumos* to be rediscovered when the palmettoes of Mexico are thoroughly collected.

Sanfordi, Linden, in Ill. Hort. xxviii, 32 (1881): nomen. Florida.

taurina, Hort. ex Martius, Hist. Nat. Palm. iii, 320, 348 (1-50): nomen. Jamaica.

Woodfordii, Lodd. ex Martius, Hist. Nat. Palm. iii, 247 (1850): nomen. Trinidad. *S. Woodfordiana*, Lodd., from Trinidad, ex Wendl. Index Palm., 36 (1854) was presumably intended to be the same.

Inodes

vestita, Cook, in Bull. Torr. Bot. Club, xxviii, 533 (1901). Founded on a plant growing in the conservatory of the United States Department of Agriculture in Washington, without nativity, differing "conspicuously from *I. causiarum* by the very large leaves and by the great development of fine brown fibers which fill all the interstices between the leaf bases." Flowers and fruits unknown, but foliage fully described; the living plant appears to be lost, nor is other material now available.

INDEX

in addition to names in the list on page 336.

Brahea serrulata: 294
Chamærops acaulis: 298
humilis: 296
Palmetto: 304
sabaloides: 298
serrulata: 294
Corypha glaucescens: 319
minor: 298
obliqua: 294
Palma: 304
Palmetto: 304
pumila: 298
repens: 294
umbraculifera: 312
Inodes Blackburniana: 330
causiarum: 315
exul: 322
glauca: 315
japa: 321
mexicana: 300
Palmetto: 306
Rosei: 335
Schwarzii: 306
texana: 334
uresana: 332
Rhapis acaulis: 298
Sabal: 296
acaulis: 298
Adansonii: 298
adiantinum: 301
bermudana: 326
Blackburnia: 330
Blackburniana: 326, 330
causiarum: 315
Deeringiana: 301
domingensis: 315
Dugesii: 335
etonia: 304
exul: 322
florida: 311
glabra: 298
glaucescens: 319
guatemalensis: 317
havanensis: 303
jamaicensis: 317
Jamesiana: 309
longepedunculata: 308
mauritiæformis: 319
megacarpa: 304
mexicana: 300
mexicana: 301, 330, 334
minima: 298
minor: 298
neglecta: 315
Palmetto: 304
var. bahamensis: 308
parviflora: 309
princeps: 328
pumila: 298
Rosei: 335
Schwarzii: 306
serrulata: 294
speciosa: 303
texana: 334
umbraculifera: 312
uresana: 332
var. *roseana:* 335
Yapa: 321
Serenoa: 293
repens: 294
serrulata: 294
Trithrinax mauritiæformis: 319